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Volume XXVIII-No. 11 November, 1955

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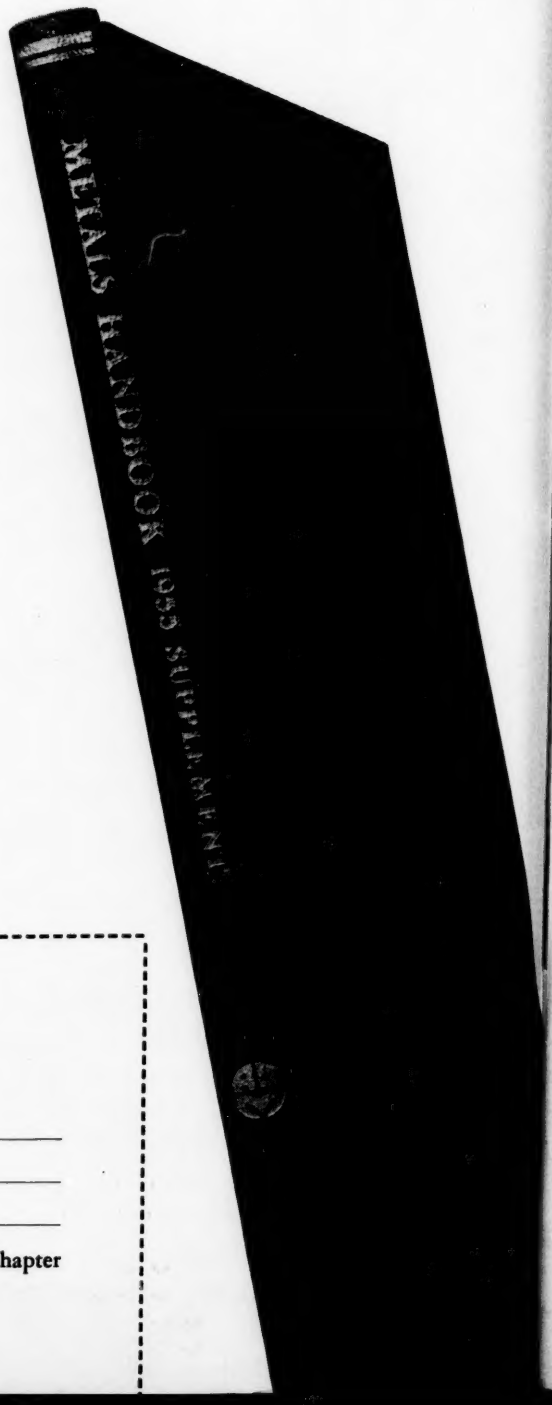

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For complete details of contents, see your August 15, 1955, issue of Metal Progress . . . which contains all the articles now being offered in this cloth-bound edition. Price is $4.00 to ASM members, $6.00 to non-members.

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Metals Review

VOLUME XXVIII, 11 November, 1955

THE NEWS DIGEST MAGAZINE

Published monthly by the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio: A. O. Schaefer, President; D. S. Clark, Vice-President; C. H. Lorig, Treasurer; W. H. Eisenman, Secretary; Walter Crafts, K. L. Fetters, G. E. Shubrooks, H. A. Wilhelm, Trustees; George A. Roberts, Past President. Subscriptions $5.00 per year ($6.00 foreign). Single copies $1.00. Entered as Second Class Matter, July 26, 1930 at the Post Office at Cleveland, Ohio, under the Act of March 3, 1879.

Claims for missing numbers will not be allowed if received more than 60 days from date of issue. No claims allowed from subscribers from overseas, or because of failure to notify the circulation department of a change of address or because copy is "missing from files".

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ASM REVIEW OF METAL LITERATURE

National Metal Congress and Exposition—A Summary

ANNUAL ADDRESS OF THE PRESIDENT

George A. Roberts Vice President-Technology Vanadium-Alloy Steel Co.

Most people, upon greeting the president of a national technical society, and particularly of the American Society for Metals, look upon his healthy countenance with surprise and express astonishment that one could fare so well physically in the face of such an arduous task. They evidently cannot remember that which has been so often pointed out to them that this job is not a chore but a privilege, an honor, and an experience full of lasting memories. I have been particularly fortunate in serving during a year in which several special events have taken place, particularly the highly successful Western Metal Congress and the Joint Metallurgical Societies Meetings in Europe. In the course of these duties I have traveled 73,715 miles — enjoying travel to its fullest, this could not be better. I am only sorry that preparations for the Western Metals Congress and other important events prevented our National Secretary, William H. Eisenman, from being with me on some of my chapter visits. His absence was noted, not only by the chapters but by your president.

I am sure, although I say this hopefully, that the American Society for Metals has continued to further its aims and objectives during the year. Three years ago, John Chipman pointed out that the communities in which chapters of the American Society for Metals are located have come to regard their chapter as the fountain head of all knowledge on the metallic subjects. Certainly there has been no lessening of this aspect, but there has been a heightening of others, including an awareness of the many responsibilities of technical and professional people in providing for proper influx of graduates into their profession. The American Society for Metals' program to encourage this influx of properly qualified people has, after many years, been firmly implanted at the local level. We can be proud of our individual chapters for their activities in this regard.

A report of this scope should probably consider the biggest things first. One year ago, at this Meeting, there was presented a report entitled "The A.S.M. of Tomorrow". We are now one year into this "Tomorrow" and I know that many of you are anxious to learn what action your Board of Trustees has taken with regard to the five points put forth in that program. Action on two of these points is started—indeed was started during the preceding official year. Action on a third has just been authorized, but has not been taken on the remaining two.

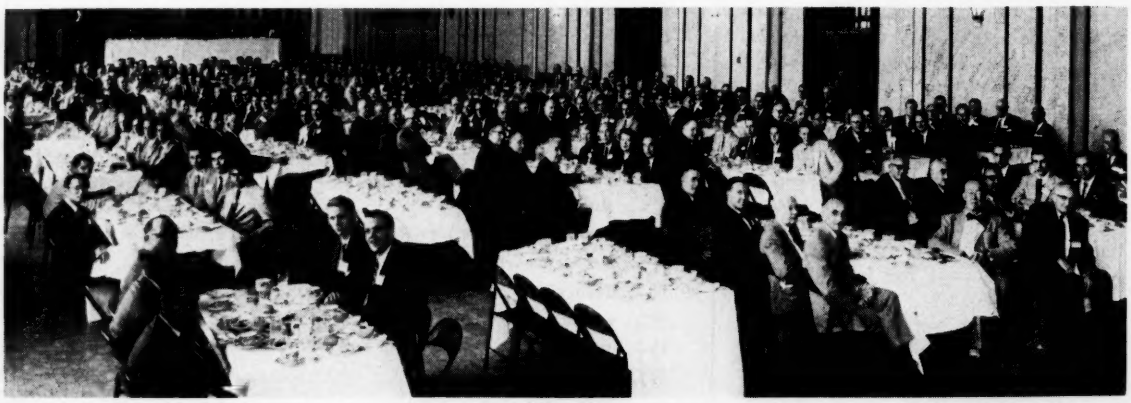
President Austin referred last year to the appointing of a Site Committee (Messrs. Van Horn, Wilson, Austin, Roberts, Schaefer) to study the matter of improving facilities for the National Office. During the year this Committee made a preliminary report to the Board, as a result of which additional studies were authorized. These were to include, on an architectural and an engineering basis, (1) an urban site, and (2) a suburban site, both to be in the metropolitan Cleveland area. It is possible that within the next few months final reports of these groups will be available for Board consideration.

Point number two, the Metals Engineering Institute, has likewise been started. Under the direction of Anton deSales Brasunas, these are the correspondence-type educational courses, also designed for in-plant training and home study. That such course material will also serve local chapters is apparent.

The Board approved, in principle, the establishment of the American Society for Metals Metallurgical Institute (called Seminars in last year's report) to cover point three of the program entitled "The A.S.M. of Tomorrow". It is expected that this program will be formulated in detail during the coming year.

So many have asked about the establishment of an American Society for Metals Research Laboratory, and an American Society for Metals Institution for Higher Learning in Metallurgy, thinking that these were accomplished facts or at least approved in principle. It is important to note here that absolutely no formal consideration of either of these proposals has been given by the Board of Trustees. In the original program it was pointed out by the Secretary that these were, in his opinion, long-range objectives, and were not to be initiated in the immediate future. There will be ample time for the proper debate regarding the feasibility and advisability of both programs. In the meantime, the Site Committee is establishing plans for space requirements, based on the currently approved portions of our plan.

During the year, the Board of Trustees held three meetings. Your president visited 37 chapters and participated in 2 regional meetings, which included an additional 8 chapters. Other trustees visited 26 chapters and 2 regional meetings, thus bringing the total to 63 chapters and 4 regional meetings.



A.S.M. 25-Year Members, Junior Members From Educational Institutions Within 100 Miles of Philadelphia, the Board of Trustees and Past Presidents of the Society Who Attended the Distinguished Service Luncheon

Commercial Museum—Convention Hall

It has often been said that the strength of the American Society for Metals lies in the local chapter, and I am sure that those of us who have been privileged to speak to so many chapters and to discuss problems with their officers are more firmly convinced of this than ever. Your comments are not only an inspiration but a stimulant to the work of those temporarily assigned to tasks at the national level. During the year, new Charters were granted to the following Chapters: Old South (Greenville, S. C.), Southern Technical Institute (student group in Macon, Ga.), Quebec (from Montreal), Edmonton, and Long Island, bringing the total number to 93.

Regarding our student chapters, the Board considered and approved an interpretative change so that any student in the engineering department of a school should be privileged to enroll for student membership in the A.S.M. if he desires.

The treasurer's report will make it apparent that the management of your Society has kept adequate controls over the purse strings. The incidence of a record year in funds available for appropriation is not, in any sense, a source of embarrassment but a source of pride. The incidence of two expositions, Western and National, in one year, has contributed to the excellent position. You will note that a significant appropriation has been made to the Building Fund. It is hoped that within another year there will be sufficient money in this fund to begin a building or purchasing program that will result in a headquarters of which we can all be proud. In addition, you should note a substantial contribution to the American Society for Metals Foundation for Education and Research.

That we are now about ready to embark upon a program of investing these funds in facilities, educational courses, etc., is proof of the foresight of those who have insisted upon the establishment of such funds over the years. It is further a cogent argument for the retention of exposition functions in the hands of the technical societies, and for the unqualified support of such technical society-managed industrial expositions on the part of industry in general.

During the year, it was felt important to review our entire policy with regard to the publication of papers and the programming and presentation of these papers and technical reports at our nationally sponsored congresses. Accordingly, the Board of Trustees authorized the appointment of a Committee, under the direction of William E. Mahin, to review this entire matter in an effort to stimulate interest, raise quality, and provide efficiency of service to the members. A report from this Committee will be received during the coming year.

In the Treasurer's report you may note an appropriation for a new service of literature indexing.

The secretary is prepared to expand on the implementation of this aim.

Your Officers and Trustees, with one exception, attended, upon invitation of the European Metallurgical Societies, the Joint Metallurgical Societies Meetings in Europe during the month of June 1955. In the course of this stimulating, though somewhat exhaustive, event, we had an opportunity to meet with industrial leaders of England, Scotland, Wales, Germany, Belgium, France, Sweden, and Italy. Representatives from other countries, principally Spain, Switzerland, Yugoslavia, the Netherlands and Finland were also in attendance. Approximately 250 Americans who attended came away highly impressed with what they saw.

Further on the international scene, the Board gave final authorization for the Second World Metallurgical Congress to be held in Chicago two years from now, on Nov. 2 to 8, 1957, at the time of the 1957 National Metal Congress and Exposition. Invitations to England, Germany, Belgium, France, Spain and Italy have already been extended.

ACTA Metallurgica has now completed its third year of operation and is expected to be on a nearly self-supporting basis in one more year. The net operating deficit for the coming year is expected to be only $10,000. The number of subscriptions stands at 1791. The American Society for Metals is extremely disappointed in the fact that it has been the only sponsoring society for this international scientific journal. It would welcome any manifestation of greater interest in the affairs of the Journal which would be occasioned by additional sponsoring support.

It is with regret that we note the passing during the year of one of our distinguished past presidents. Herbert J. French, who was president of your Society in the year ending 1943, succumbed on Aug. 17, 1955, after an illness of moderate duration. Mr. French presented the Campbell Memorial Lecture in 1933, and was the Henry Marion Howe Medalist in 1930; a truly remarkable man whom we shall all miss.

President George A. Roberts Is Shown Presenting A.S.M.'s Distinguished Service Award to the International Nickel Co., Inc. John A. Marsh (center), vice-president and general manager, operating department, receives the award, while A.S.M. Past President Bradley Stoughton (right) looks on

On behalf of the American Society for Metals, I wish to express our thanks to those societies which have joined with us in this National Metal Congress for their fine cooperation. The programs of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers, of the American Welding Society, of the Society for Nondestructive Testing, and of the Industrial Heating Equipment Association, Special Libraries Association, Atomic Energy Commission and United States Army Ordnance Department have made a significant contribution to the success of this gathering.

I wish to also express my appreciation for the wholehearted support that I have received from chapter officers and my colleagues on the Board of Trustees. Particularly should the support and cooperation shown throughout the past few years by our retiring members of the Board of Trustees not go unnoticed; to past president and retiring trustee, James B. Austin, for his specific encouragement and for his extreme contribution to the success of the European Meeting this summer; to our retiring treasurer, William A. Pennington, whose good humor and sound judgment have been stimulating; to retiring trustees Robert J. Raudebaugh and G. M. Young. And in the same breath, may I welcome the new officers to be elected this morning.

No president's report would be complete without a repetition of the heartfelt sentiment and gratitude that he carries out of office with him for the genius of and creative assistance given by Bill Eisenman. His staff, performing their tasks in exemplary and efficient manner, are likewise a tribute to his skill as a manager for your Society's affairs. Without this support no president could even begin to do some of the things assigned to his office.

ANNUAL REPORT OF THE SECRETARY

W. H. Eisenman

The American Society for Metals on Oct. 1, 1955, had a total membership of 25,250, a gain of 950 members since last October. Of this number, 21,690 are regular members, 1170 are student members, 2211 are sustaining members, 78 are honorary and life members and 101 are in the armed forces.

Publications Committee: During the year the Committee reviewed 96 papers. Of this number, 47 were approved for publication in *Transactions,* 39 of which were selected for presentation at the October National Metal Congress and 8 for publication in *Transactions* only.

Transactions: Volume 47 totals 1068 pages and contains 48 technical papers and their discussions. It contains all of the papers that were presented at the 1954 Convention held in Chicago. Volume 47A contains 12 papers (328 pages) presented at the Seminar on "Impurities and Imperfections" held on Saturday and Sunday, Oct. 30 and 31, 1954.

Preprints of Convention Papers: The total number of pages in this series of preprints is 834. A total of 46,000 preprint copies was distributed free to those members who requested them.

Metal Progress: The year 1955 was the most successful in the history of your monthly engineering magazine. The total advertising volume (1911 pages) has been exceeded five times by small margins. Editorial pages in the 12-months' issues totalled 854 pages—also an all-time high.

With the end of the 1955 fiscal year, *Metal Progress* completed the first 25 years of its life, and it was commemorated with an anniversary issue dated September, wherein 17 interesting articles on as many branches of the metals industry describe the existing situation, tell how we got that way and venture an opinion about where we go from here.

Metals Review: Special features carried during the year included the annual Student Members Placement Service in the February issue, a series of special stories on the Joint Metallurgical Societies Meeting in Europe, and programs of the National Metal Congress and Western Metal Congress.

The monthly Review of Metal Literature was again correlated into the 11th bound volume, which carried a total of 831 pages and 9303 annotations.

Seminar: The Seminar on the Theory of Alloy Phases this year was indeed an outstanding success in every respect. It was arranged into five sessions, three on Saturday and two on Sunday, with the meeting room filled to capacity. This interest is a great compliment to the Committee and especially to the authors who presented their subject matter so splendidly.

Metals Handbook Committee: The second Supplement was issued as a 13th issue of *Metal Progress,* dated Aug. 15, 1955. Nineteen author committees submitted reports on 21 subjects selected by the Handbook Committee. Additional committees are being formed to bring the Handbook articles up to date.

Books: During the past year, 30,161 books published by the Society were sold to members of the Society and others. This figure includes 1953 A.S.M. Metals Handbooks, 4757 Metals Handbook Supplements printed in July 1954, and 2978 Transactions. The seven titles added to the list during the past year were: Basic Metallurgy, Behavior of Metals Under Impulsive Loads, Transactions of A.S.M.—Vol. 47, Impurities and Imperfections, Review of Metal Literature—Vol. XI, The Metal Beryllium (39 authors), and Utilization of Heat Resistant Alloys (17 authors).

Educational Committee: The Committee arranged the educational lectures for this meeting, consisting of four

Left: Kenneth Rose, Professor and Chairman of the Department of Metallurgy, University of Kansas, Received the A.S.M. $2000 Metallurgy Teaching Award for 1955 at the Annual Meeting. Center: President George A. Roberts (right), presents certificate to Robert H. Aborn, director of research laboratories, U. S. Steel Corp., who delivered the Edward deMille Campbell Memorial Lecture after the annual meeting. (Right) E. G. Guenther, chief metallurgist, Wisconsin Motor Corp., was one of the chapter secretaries who were guests of A.S.M. during the week of the National Metal Congress and Exposition in recognition of their long years of service

lectures by B. R. Queneau, U. S. Steel Corp., on "Embrittlement Phenomenon", and the series for the 1956 meeting which will be on "Residual and Trace Elements in Metals and Their Effect on Properties".

Vocational Education Committee: Under the capable chairmanship of William Collins of the Boston Chapter, this Committee has had as its principal field for the past three years Vocational Teacher Training in Metals Technology. This activity has the full cooperation of top state-level administration.

The momentum inaugurated by the Committee has been such that the Teacher Training is now proceeding on its own, and the Committee is now turning its concentrated energies to work in cooperation with the Technical Institute.

Science Achievement Awards: The A.S.M.'s Fifth Annual Program of Science Achievement Awards for students in the junior and senior high schools, public, parochial and private, in the United States and Canada, has just been announced by the National Science Teachers Association under whose auspices the program is carried out. There are 140 awards totaling $10,000 in Government bonds for projects in any field of science or mathematics. While many groups are working at the high school level to recruit students for the engineering schools, the A.S.M. is the only society extending its activities into both the junior and senior grades.

Visiting-Lectureship: The Lectureships have become increasingly popular and 12 schools made application for lecturers to conduct a two-day seminar on the campus. The reports from the schools express their thanks for the service and indicated complete satisfaction.

Metallographic Exhibit: A traveling exhibit of the prize winners and a few honorable mentions was mounted and started on a chapter circuit. The panels were placed on display before some 19 chapter and several educational institutions.

Mechanized Literature Searching: The Board of Trustees, at its meeting on Aug. 22, approved a pilot plant study of mechanized searching to be conducted under a contract with the Center for Documentation and Communication Research at Western Reserve University. It is estimated that the pilot operation will take from two to five years and will encompass the indexing of some 23,000 documents. The contract is written on an annual basis at a cost of $15,000 per year.

Assuming that the system is proved successful, services of various types will be possible—answers to specific questions, compilation of bibliographies, monthly lists of references in certain specific branches of metallurgy. Thus the A.S.M. will not only be able to offer a greatly expanded literature service to its members and to the profession, but is also taking the lead in solving a problem that is most pressing in all scientific fields.

Young Engineers' Day: The Society again extended an invitation to all student members of educational institutions within a radius of 100 miles to be the guests of the Society on Friday, Oct. 21, to visit the Exposition and attend the Distinguished Service Luncheon, given by the Society in honor of 25-year members. Some 200 student members and faculty will attend the event, together with over 200 of the 25-year members.

National Metal Congress: The program for the Congress this year was more varied and intense than any during the previous years. The general trend in the Convention program has been greater diversification of the subjects presented, and while this leads to a more varied technical program, nevertheless it serves the wide interests of the Metal Congress attendance.

National Metal Exposition: The National Metal Exposition now in session equals the number of exhibitors, some 450, and the amount of square feet, 150,000 net, tnat has characterized the expositions in the past. This is the 6th Metal Exposition that has been held in Philadelphia, and is the 37th in number. The first Exposition was held in Chicago in 1919, and the second in Philadelphia, just 35 years ago.

THE ASM OF TOMORROW

As a reminder to those who were present at the Annual Meeting a year ago and for the benefit of those who were not present, I wish your indulgence while I restate, briefly, the five points I proposed in my plan for THE ASM OF TOMORROW.

A NEW, ADEQUATE, IMPOSING A.S.M. HEADQUARTERS BUILDING

NO. 1—APPROVED: Leadership is the sum total of many things, not the least of which is *looking the part!* The present A.S.M. headquarters lack the sufficient space, are susceptible to fire, burglary and are located in a down-trend area. To correct this, it has been approved that a new headquarters site be selected and a new concept of A.S.M.'s present and future needs be incorporated in today's planning of the building.

THE A.S.M. METALS ENGINEERING INSTITUTE

NO. 2—APPROVED: This vital and aggressive idea was born of an urgent national need . . . that of developing on-the-job and home-study courses to produce a vast and extremely useful number of skilled technicians in industry. With fewer than 9,000,000 skilled men in our current labor force of some 62,000,000 . . . this nation needs millions more men in the metals industries who will know not only what is happening to the metals they work with . . . but why . . . and how.

To create these on-the-job and home-study courses, the best talent in the country has been selected and men of real achievements in metallurgy, in metals engineering, production and development were assigned to write clear . . . easily understandable . . . nontechnical courses on the subjects in which they excel. Some of these courses have been completed . . . and they offer a quick, concise and workable method of training millions of skilled men into skilled and knowing technicians! There will be 40 such courses available . . . for A.S.M. Chapter Educational Courses . . . for on-the-job training . . . for home-study by individuals.

THE A.S.M. METALLURGICAL SEMINARS

NO. 3—APPROVED: Top metals scientisist and metals specialists will head intensive one-week and two-week seminars on current phases of metallurgy and metals engineering. Scheduled throughout the year, these A.S.M Metallurgical Seminars would fill a great need . . . will provide working metals engineers with quick, effective and profitable refresher courses . . . or highly informative and helpful introduction to new metals, methods and processes.

THE A.S.M. METALS RESEARCH LABORATORY

NO. 4—TO BE CONSIDERED AT A LATER DATE: In line with the dynamic expansion plans so far approved, the Metals Research Laboratory, properly organized and directed, would fill an area now unoccupied and perform important functions now neglected, yet of great importance to America's metallurgical advances.

At present, laboratories in and for the metals industry may be roughly subdivided as follows: (1) Laboratories in the individual plant or in a central location of a single corporation . . . (2) Government laboratories, essentially in the same categories as those mentioned above . . . (3) Commercial testing laboratories, many of which are doing development work . . . However, in metallurgy these are largely confined to inspection and representation . . . (4) University and endowed (or self-supporting) research institutes, whose work is principally an extension of that listed in subdivisions 1 and 2 upon well-defined problems beyond the manpower or instrumentation available in the sponsor's own laboratory . . . (5) Laboratories for fundamental research, of which there are only a few. With only one of the above listed laboratory groups working at the advanced frontiers of knowledge, it may be readily seen that there is a very wide, and fruitful, field open to the A.S.M. Metals Research Laboratory . . . the whole area of industrial problems in metals of widest generality, useful to the whole metals industry, or to the whole heat treating industry, or to the whole super-power industry, etc. Since there is nothing like it in America, the A.S.M. Metals Research Laboratory, with the objective of solving general problems concerning the use, improvement and application of metals in industry, would not be competing with existing effort, but would, in fact, fill a great gap in American metallurgical research.

THE A.S.M. METAL SCIENCE UNIVERSITY

NO. 5—TO BE CONSIDERED AT A LATER DATE: An intriguing and provocative idea, a natural step from the research desk to the teaching platform . . . certain to attract to it the top metal scientists, engineers and researchers . . . It would offer courses *only* in metal sciences . . . beginning with third-year students and continuing through the post-graduate studies. To such a student body, the great teaching abilities of the best in America would be offered . . . and from such a group of teachers and students would, of necessity, come important achievements and trained scientists.

These five points represent large plans.

I can think of no better way to enlist your support for THE A.S.M. OF TOMORROW than to recall the supplication made last year when the original plans were presented, which was: "the A.S.M. should make no *LITTLE* plans".

May I repeat the statement of the eminent architect, David H. Burnham, who wrote:

"Make no little plans.
They have no magic to stir one's blood and probably themselves will not be realized.
Make only *big plans*
Aim high in hope and work
Remembering that a noble, logical diagram once recorded
Will never die
But long after we are gone
Will be a living thing
Asserting itself with ever growing insistency."

I am sure a new life of service and usefulness is unfolding for the A.S.M. It has and will continue to grow in stature and prestige. You have established its leadership. These plans for the present and future have kindled for the members a brilliant vision of new progress, expansion and services.

The receipt from many members of commendations and their assurances of support and cooperation in the fulfillment of these plans has been a source of great satisfaction to all concerned. It proves that the members also aim high in hope, and are deep in the belief that no logical plan is impossible of accomplishment when united effort goes to work. The A.S.M. has taken on new life and vigor by directing its capabilities in new and constructive channels.

If the A.S.M. is not to grow old and stagnant and travel in the same old yearly rut, one must ask this question: "Is the A.S.M. continually widening its interests? Is it looking to the future and planning for the great events ahead, of which it is so capable?"

I can give you the answer. With my knowledge of your whole-hearted support and tremendous abilities to grasp and do new things, I can state with every assurance that the first 38 years of this Society's existence have witnessed only the beginning of its accomplishments. The years to come will sparkle with magnificent achievements that you are now constructing on today's firm foundation.

The A.S.M. will never grow old . . . for a society becomes old only when it ceases to grow. "Cease to grow" could never be the motto of THE ASM OF TOMORROW.

IHEA Holds Sessions During Metal Congress

Sitting in on the Industrial Heating Equipment Association's Panel Session on "Mechanized Heat Treating" Held During the National Metal Congress and Exposition in Cooperation with the American Society for Metals, Were, From Left: Harry Osborn, George McCormick, Martin Neumeyer, Leon Rosseau and Al Tarr

Under the able guidance of Al Tarr, public relations chairman, Leeds & Northrup Co., the panel sessions of the Industrial Heating Equipment Association, in cooperation with the American Society of Metals, went along smoothly on Tuesday and Wednesday during the week of the National Metal Congress and Exposition.

Set up in the Convention Hall's big Main Ballroom, the Tuesday panel presented an expert discussion of vacuum melting, by Frank Chesnut of Ajax Electrothermic Corp., batch-type strip annealing, by Floyd Olmstead of Lee Wilson Engineering Co., and combustion and its control by Fred Bloom, Bloom Engineering Co.

Interest followed through on the Wednesday panel when mechanized molten baths were discussed by Leon Rosseau of Ajax Electric Co., mechanized batch-type furnaces by Martin Neumeyer of Sunbeam Corp., mechanized continuous furnaces by George McCormick of Industrial Heating Equipment Co., and induction heating by Harry Osborn, Tocco Division, Ohio Crankshaft Co.

Success of this third IHEA program has already led to preliminary plans for a presentation at the 1956 Metal Show in Cleveland. Comprehensive reports of the papers presented this year will appear in the November and December issues of *Metal Progress.*

Rickover Urges Special Schools Be Set Up to Solve Engineer Shortage

An urgent plea for more engineering graduates and for the advancement of metallurgical science itself was made at the annual dinner of the American Society for Metals by Read Admiral H. G. Rickover, U.S.N., chief, Naval Reactors Branch, Division of Reactor Development, U. S. Atomic Energy Commission.

Addressing nearly 400 of the nation's metallurgical leaders during the recent Metal Show in Philadelphia, Adm. Rickover demanded constant and speedy improvement in the metallurgical sciences as a basis for continuing successful applications of nuclear power. He discussed the problems involved in creating the first atomic submarine, the Nautilus, and said "Metallurgy holds the key not only for the rapid development of atomic power but for many other fields as well".

Admiral Rickover cited figures of the Advisory Committee on Metallurgical Education of A.S.M. to show that from 1950 to 1955, the total enrollment of undergraduates and graduates in engineering schools has dropped steadily. He said, "The satisfactory resolution of this situation will require a sustained and co-ordinated industry-wide attack over a period of many years. It may require the establishment of special schools by your industry, and a permanent system of recruitment and support of students. It may also require a very liberal policy of university instruction for your present employees, both at undergraduate and at graduate levels.

"With the existing shortage of scientists and engineers in the United States, and the rapid development of all technology, it is certain that for many years to come the shortage of trained personnel will not be satisfied.

"An essential function of management and leadership, both in government and in industry, is to plan for the future. What we do today was largely determined for us by the vision and action of those who preceded us. Likewise, tomorrow's events will depend on what we plan and do today—on the wisdom we use in planning for the future.

"You are faced with the tremendous problem of converting metallurgy from an art to a science. To do so will require the efforts of a very large number of skilled scientists and engineers. The major problem which you face is the recruitment and training of these people. In my opinion those organizations which take heroic steps to solve this problem will be tomorrow's leaders.

"More than twenty centuries ago Archimedes said, 'Give me a fulcrum and I can move the world'. If he were alive today he might say, 'Give me a suitable metal and I can contain temperatures as high as those of the sun'."

O.E.E.C. Publishes Book On Powder Metallurgy

The book "Powder Metallurgy", recently published by the Organization for European Economic Co-Operation in Paris, is now available in the United States from the O.E.E.C. Publications Office, 2002 P St., N.W., Washington 6, D. C. The book costs $3.00.

The O.E.E.C. feels that members of the American Society for Metals will be particularly interested in this volume because the 28 representatives of seven European countries who prepared the report were present during the 35th National Metal Congress and Exposition, held in Cleveland in 1953.

Winners in A.S.M. Metallographic Exhibit

National Metal Exposition, Philadelphia, Oct. 17-21, 1955

Best in Show
Grand Prize of $100

Francis M. Cain, Jr.
Westinghouse Atomic Power Division, Pittsburgh, Pa.
"Hydride Platelets in Uranium, 12% Molybdenum Alloy"

Carbon and Alloy Steels

Best In Class: Robert E. Smith and William C. Hagel, General Electric Co., Large Steam Turbine Generator Dept., Schenectady—"Ferritic Cr-Mn-V Laboratory Steel, Unaged and Aged".

Stainless Steels and Heat Resisting Alloys

Best In Class: Erwin H. Schmidt, A. O. Smith Corp., Milwaukee — "Stress-Corrosion Cracking Originating From Bottom of Corrosion Pits on Service Surface, Type-316 Stainless Steel".

Honorable Mention: Eric N. Bamberger, General Electric Co., Aircraft Gas Turbine Division, Evendale, Ohio —"J1570 Super Alloy; Pronounced Widmanstatten Structure Obtained Upon Overaging at 1800° F. Five Days in Air".

Honorable Mention: George F. Tisinai, Standard Oil Co. of Indiana, Whiting, Ind.—"Sigma Formation in Delta Ferrite of 24-14 Cr-Ni Stainless Steel".

Iron, Cast and Wrought

Best In Class: Raymond E. Skoda, General Electric Co., Research Laboratory, Schenectady—"Graphite Nodules in Cast Iron; Bright Field and Polarized Light".

Aluminum, Magnesium, Beryllium, Titanium and Their Alloys

Best In Class: R. D. Buchheit, A. P. Young and G. A. Wheeler, Battelle Memorial Institute, Columbus, Ohio—"A Comparison of Electron and Light Microscopy on a Titanium, 3.4% Mn Alloy".

Honorable Mention: Edmond J. Klimek, Armour Research Foundation, Chicago—"The Mg_7 Zn_3 Phase".

Copper, Nickel, Zinc, Lead and Their Alloys

Best In Class: William A. Roman, General Electric Co., Research Laboratory, Schenectady — "Nickel (76.5%), Plus Zirconium (23.5%), As Cast".

Honorable Mention: Edmund J. Klimek, Armour Research Foundation, Chicago— "The Structures of 'Kanigen'—First Amorphous Metal Produced in Massive Form".

Metals and Alloys Not Otherwise Classified

Best In Class: Robert M. Slepian, Westinghouse Electric Corp., East Pittsburgh, Pa.—"An Unusual Cluster of Short Narrow Twins in Hyper-Pure Silicon".

Honorable Mention: Charles Tufts, Electron Microscopist, Ruth Smith, Technician, and Larry Ankersen, Photographic Enlargement, Sylvania Electric Products, Inc., Bayside, L. I., N. Y.—"Electron Micrograph of Cold Worked Tungsten Wire".

Honorable Mention: Jean H. Tomlinson, General Electric Co., Research Laboratory, Schenectady—"Zr Plus 3% Al Plus 5% Fe Annealed at 950° C.; Polarized Light".

Series Showing Transitions or Changes During Processing

Best In Class: R. D. Buchheit and A. D. Friday, Battelle Memorial Institute, Columbus, Ohio—"Effect of Temperature on Ductility During Impact".

Welds and Other Joining Methods

Best In Class: Charles A. Fournier, Ford Motor Co., Aircraft Engine Division, Chicago—"Interfacial Defects at the Outer Periphery of Resistance Spot Welds in Type-410 Stainless Steel".

Honorable Mention: Eric N. Bamberger, General Electric Co., Aircraft Gas Turbine Division, Evendale, Ohio —"Titanium Silver Brazed in Vacuum".

Results by Unconventional Techniques

Best In Class: W. H. Couts, Jr., J. E. Gates, J. E. Boyd and G. A. Wheeler, Battelle Memorial Institute, Columbus, Ohio.—"As-Cast Type-310 Stainless Steel With Misch Metal and Radioactive Lead Additions".

Honorable Mention: F. Agnes Forster and S. R. Rouze, General Motors Corp., Research Laboratories Division, Detroit — "Micro-Interferogram of a Nickel Plated Vapor Blasted Steel Surface".

Honorable Mention: Jean H. Tomlinson, General Electric Co., Research Laboratory, Schenectady — "Barium Titanate Single Crystal; Clarity of Twins Due to Final Etch".

Slags, Inclusions, Refractories, Cermets

Best In Class: R. T. Knaggs, General Electric Co., Large Steam Turbine Generator Department, Schenectady—"Graphite in an Experimental Carbon Steel With Aluminum Deoxidation After 3000 Hr. at 1100° F."

Honorable Mention: Francis M. Cain, Jr., Westinghouse Atomic Power Division, Pittsburgh — "Hydride Platelets in Uranium, 12% Mo Alloy".

Color Micrographs

Best In Class: Francis M. Cain, Jr., Westinghouse Atomic Power Division, Pittsburgh—(See Best in Show)

Honorable Mention: W. M. Balyk, United States Steel Corp., Applied Research Laboratory, Monroeville, Pa.—"Skeletal Melilite Crystals in a Stringer of Blast Furnace Slag".

Surface Phenomena

Best In Class: T. K. Bierlein and R. S. Kemper, General Electric Co., Richland, Wash.—"Surface Attack by NaK on Zircaloy-2".

Honorable Mention: Edward Koch, General Electric Co., Research Laboratory, Schenectady—"Growth Markings on Copper Whisker—Oblique Illumination".

Austin Plots Future Of Metallurgy for Philadelphia Members

Speaker: James B. Austin
U. S. Steel Corp.

The **Philadelphia Chapter** heard a talk, "Your Future in Metallurgy", by James B. Austin, assistant vice-president, fundamental research laboratory, U. S. Steel Corp., and past-president A.S.M., at a recent meeting.

This first meeting was used to inaugurate the A.S.M. metallurgy course given at Temple University. The course, taught by A.S.M. members in the evening, is now in its 35th year. To date, the course has enrolled over 3000 students and it is expected that at least 150 students will benefit from it this year.

Dr. Austin reviewed the growth of our knowledge of metals. In the Book of Numbers, six metals—copper, gold, silver, tin, iron and lead—are mentioned. These metals remained in use for thousands of years and were the only metals in use until about 150 years ago.

With the development of the steam engine retarded by the lack of proper materials of construction, and with the increased demand for this innovation in transportation, the art of making steel grew rapidly.

In the 20th century, with new fabricating methods and better techniques, the growth of new metals in the last 50 years has exceeded developments over the past 5000 years.

However, the metallurgist and his counterparts are still considered by many as service men, although appreciation of his worth is steadily increasing. The growing demand for new metals and the requirements of jet engines and nuclear reactors for materials resistant to high temperatures and pressures has helped tremendously in the development of the field of metallurgy.

In a look at the future, Dr. Austin pointed out that a calculated risk exists in any prediction because of the various complex factors involved. Although we know that 70 elements can be classified as metals, a relatively small number of them can be considered of large-scale commercial importance.

The ancient group is still being used. Gold is the great paradox—we mine, refine it and then return it to the ground in Fort Knox. Silver is still of importance and its uses in industry are growing. Lead is used in ammunition and tank linings, but its future growth is uncertain. Tin is used in great amounts for plating on steel, collapsible tubes, and as an alloying element. However, since we have no domestic supply, substitutes are continually being sought. Copper will always have use in applications which require high electrical and thermal conductivity. However, aluminum is giving copper stiff competition for electrical equipment, especially since the price of aluminum has dropped below that of copper. Copper is used as an alloying element in the high-strength bronzes and such special alloys as beryllium copper, monel and so on.

Iron and steel will not be replaced in the next few decades as materials of construction, but they are receiving some competition from aluminum, titanium and plastics in certain applications.

The light metals have made great strides in recent years. Aluminum has an excellent future. It is castable, weldable and corrosion resistant. Magnesium must wait for technological improvement before its full market potential can be realized. It has a tremendous future as an alloy in aircraft construction, and in mildly stressed applications where lightness and rigidity are essential.

Titanium and zirconium are finding new applications every day. Titanium, with its unusual combination of properties of light weight, strength, ductility and corrosion resistance, has emerged from its experimental stage, but before it can be developed to a higher level of commercial importance, a low-cost production process must be developed and new alloys designed. If the price can be lowered, to the order of $1 per lb., it will find a myriad of applications in aircraft, ordnance and chemical industries.

Zirconium too has obvious possibilities, especially in nuclear and high-temperature applications. However, it is expensive.

In the precious metals, besides silver and gold, we can also plot the future of platinum. Because of its stability at high temperature, excellent corrosion resistance and catalytic action, platinum finds numerous new applications in industry. Its high initial cost is balanced by the high scrap recovery value.

The metals of the radio-active industry will soon be commonplace as sources of energy, but growth as a source of energy depends on success in finding suitable materials of construction and lower cost of fissionable materials.

The new metals and alloys have a bright future. As competition becomes keener and ample outlets for metals on the market arise, many new alloys will appear and better utilization of the less common metals will be made. The rapidly increasing demand for high-temperature and pressure and low-temperature applications, followed by the increasing growth of research in advancing the science of metals, has turned metallurgy into a science.

As to the future of metallurgy, a corollary to the bright future of metals is the bright future for metallurgists. The major bottleneck that now exists is lack of properly trained personnel.—**Reported by Louis F. Calzi for Philadelphia Chapter.**

Gemologist Speaks at Oak Ridge Chapter

Don Hendrix (Left), Technical Chairman and University of Tennessee Student, Examines a Replica of One of the World-Famous Diamonds Provided by Robert G. Chapman, Gemologist at Kimballs, Inc., Who Spoke Before a Joint Meeting of the Oak Ridge Chapter and the A.I.Ch.E., University of Tennessee Student Chapter. (Reported by Anton Brasunas)

Schaefer Talks on Forgings at Jersey

A. O. Schaefer (Left), Vice-President, Midvale Co., Who Spoke on "Heat Treatment of Small and Medium Sized Forgings" at a Meeting Held by the New Jersey Chapter, Is Shown With R. A. Grange, Chairman of the Chapter

Speaker: A. O. Schaefer
Midvale Co.

Hurricane Ione ushered in the first meeting of the season of the **New Jersey Chapter.** A. O. Schaefer, vice-president, Midvale Co., and president A.S.M., spoke on the "Heat Treatment of Small and Medium Sized Forgings".

Mr. Schaefer stated that there are three phases of the heat treatment of forgings which differ from the conventional heat treatment of other steel products: Heat treatment to avoid flaking; quenching techniques; and heat treatment for dimensional stability.

Flakes are peculiarly the dread disease of forgings and their cause is a subject of much controversy. One popular belief is that flakes are due solely to hydrogen and the stresses causing the flakes are due to this gas coming out of solution in the metal, while another is that stresses are primarily due to volume changes incident to transformation. Recent data indicate that both hydrogen and transformation stresses must be present for flaking to occur. Protective heat treatment consists of a series of controlled cooling and heating cycles, which allow hydrogen to escape and minimize residual stresses.

The proper quenching media must be used to give a completely martensitic structure so that maximum resistance to brittle fracture is obtained. Large forgings which were formerly air cooled are now being liquid quenched, water being used in many instances where it was thought that oil was necessary. Quenching liquid requires adequate circulation and must be kept cool.

Optimum dimensional stability is obtained by allowing complete transformation before reheating, slow and controlled cooling from tempering heat, tempering below carbide formation temperature and stress relieving after any machining operation.—**Reported by M. Margolis for New Jersey.**

Powder Metal Presses Explained and Observed at Junior Section Meeting

Speaker: Lawrence H. Bailey
F. J. Stokes Machine Co.

The F. J. Stokes Machine Co. played host to the **Junior Section of the Philadelphia Chapter** at its first meeting this year. Lawrence H. Bailey, chief engineer, spoke on "Stokes Presses and Powder Metallurgy". He presented a brief historical background of powder metal presses, stating that Stokes first manufactured presses for pharmaceutical tablets. Since the turn of the century, the presses have been improved and made in larger sizes to adapt them for many new uses, including powder metallurgy.

Powder metallurgy was described as a method of forming metal parts from fine metal powders compressed to shape by mechanical means and held in shape by bonding the molecular edges of the powder particles under heat.

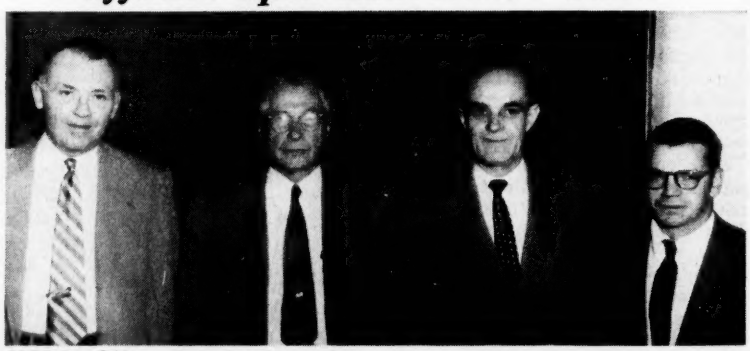
The powder metal process consists normally of two steps. First, a given quantity of metal powder plus a lubricant is compressed from 20 to 50 tons per sq. in. The resulting compact is known as a green briquette. Secondly, the green briquette is heated in a furnace with an inert atmosphere to a temperature usually well below the melting point of the solid metal. This process, called sintering, converts a fragile green briquette into a strong metal part.

Mr. Bailey stressed the importance of proper lubricants, proper die and punch material, as well as design and correct pressures, as being requisite to good powder metal parts.

The speaker concluded with a discussion of the many advantages and the growing commercial applications for powder metal parts.

Following the lecture, the group was taken on a guided tour of the plant, where the manufacture of powder metal presses and high vacuum equipment was observed.—**Reported by Willard L. Hunsberger for Junior Section, Philadelphia Chapter.**

Officers Open Educational Series



1955-56 Officers of the New Haven Chapter Who Were Present at the First in a Series of Six Lectures on the "Heat Treatment of Ferrous and Nonferrous Metals" Include, From Left: M. J. Weldon, Chairman; Edwin P. Holtberg, Vice-Chairman; Harold O. Seeley, Treasurer; and R. C. Raymond, Secretary. Lectures to be included in the educational series will cover: Principles of Heat Treatment of Nonferrous Metals; Properties of Nonferrous Metals After Heat Treating; Principles of Heat Treatment of Carbon and Alloy Steels; Hardening, Hardenability and Tempering; Properties of Heat Treated Ferrous Metals; and a panel discussion on Practical Heat Treating Problems. (Reported by Kenneth L. Tingley)

Speaks on Pipe and Tubing in Alberta

C. E. Makepeace, Chief Metallurgist, Page Hersey Tubes Ltd., Spoke on "Manufacture of Steel Pipe and Tubing in Canada" at a Meeting of Alberta Chapter. At the head table were, from left: H. M. Thomas, J. Murray, and Mr. Makepeace, all from Page Hersey; C. Kingsep, chairman; W. C. Rowe, secretary-treasurer; E. M. Evans, past-chairman; G. Hare, student affairs and history committee; and E. A. Kutrky, membership committee

Speaker: C. E. Makepeace

Page Hersey Tubes Ltd.

C. E. Makepeace, chief metallurgist, Page Hersey Tubes Ltd., discussed the "Manufacture of Steel Pipe and Tubing in Canada" at a meeting held by the **Alberta Chapter.**

Mr. Makepeace gave an interesting explanation of the manufacture of stretch reduced continuous weld pipe, cold expanded electric resistance weld pipe, seamless tubing, cold drawn tubing, rocked tubing, welded tubing, tubing welded from cold rolled strip and standard pipe. He mentioned that the steel tubular products have 22 classifications, according to use.

The procedure of manufacture was explained with the help of slides and a lively question and answer period was held at the conclusion of the talk.—**Reported by J. E. Grantham for Alberta Chapter.**

Role of Radio-Isotopes for Radiographic Testing Cited

Speaker: James Shilstone

Shilstone Testing Laboratory

James Shilstone, Shilstone Testing Laboratory, Spoke on the "Use of Radio-Isotopes for Radiographic Inspection" at a meeting of the **New Orleans Chapter.**

Radiographic inspections have found wide usage in the metal industries. The selection of the proper isotopes and film is of most importance in obtaining desired results. The strength of the isotopes, as well as the sensitivity of the film, must be carefully selected to bring out the most minute flaw in castings and welds.

The advantages of radioisotopes in radiography are its versatility and penetrating power, the material can be placed inside tanks, valves and other castings, sometimes impossible to reach with conventional X-ray equipment, and radioisotopes are more economical.

Other uses of this new tool include gaging the thickness of sheet metal, the level of liquid in a tank and traces in pipelines, and for friction studies on lubricants, leaks in water line, etc.—**Reported by Sherman Faught for New Orleans.**

E. M. Evans (Left) Is Shown Receiving a Past-Chairman's Certificate From H. J.Farrow, Chairman of the Education Committee, at a Meeting in Alberta

Penn State Opens Season With Scholarship Awards

Penn State football, the announcement of the winners of scholarships and awards, and what may well be the largest freshman class ever to be enrolled in a university metallurgy curriculum were the highlights of a recent meeting at **Penn State.**

Chairman M. J. Mianulli, Titan Manufacturing Co., launched the first meeting of the season with a talk emphasizing the advantages of A.S.M. membership. Amos J. Shaler, head of the department of metallurgy, welcomed the incoming freshman class, a group which numbers 49, and announced the winners of nine scholarships and awards.

The A.S.M. Foundation for Education and Research Scholarship was awarded to Carl Skooglund, Jr. Recipients of the Cooperative Program Scholarships in Metallurgy for 1955-56 include Paul Berenbrok, Robert Betts, Edward Scott, Gerald Spaeder, George Gorniak and Joseph Binczewski. The William Grundy Haven Scholarship was won by Hal Harman and the John White Scholarship for Graduate Studies was awarded to Alexander Simkovich.

James J. O'Hara of the Penn State coaching staff entertained students, faculty and industry representatives with films of the Penn State-Boston University football game and discussed Penn State football prospects for the current season.—**Reported by Ralph G. Dermott for Penn State.**

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Anniversary — The American Cast Iron Pipe Co., Birmingham, Ala., will celebrate its 50th anniversary this month. The celebration will be climaxed with the release of a 52-page history of the company entitled People and Pipe.

Fatigue in Aircraft—Columbia University will hold an International Conference on Fatigue in Aircraft Structures in New York from Jan. 30 through Feb. 1, 1956. Information can be obtained from: Prof. A. M. Freudenthal, 716 Engineering, Columbia University, New York 27, N. Y.

Dedication—Lehigh University's new Fritz Engineering Laboratory was dedicated in October. The structure houses the world's largest universal testing machine and the Amsler repeated load equipment, unique in the U. S.

Scholarship—Gardner-Denver Co. has established an engineering scholarship fund in recognition of the need that exists throughout the country for an ever-increasing supply of technically trained engineers.

To Produce Ingots—Reynolds Metals Co.'s new Philippine plant, 49% owned by local investors, has begun fabricating sheet and foil from imported ingots. The company is now planning to produce primary ingot in the Philippines.

Pilot Plant—Anaconda Aluminum Co. plans to build a pilot plant, probably near Spokane, Wash., to try out its process for getting alumina from domestic clay.

ALCOA—Aluminum Co. of America has announced that its new material is a low-temperature tar derived from carbonization of lignite. Alcoa has built a tar recovery unit in Rockdale, Tex., and says it will now be able to produce 16,000 gal. of lignite tar a day.

To Head Research Group—William Shockley, ASM., inventor of the junction transistor and formerly director of transistor physics research at Bell Telephone Laboratories, has been hired by Beckman Instruments, Inc., Fullerton, Cal., to build an entire new research group and to continue research in the field of semiconductors.

Aluminum Houses—The Colombian Government has contracted to buy 3200 light-weight aluminum houses, which can be transported easily to remote regions by jeep, truck or plane, and erected in a few hours. The homes, made from Canadian aluminium, are being supplied through the international facilities of the Aluminium Ltd. group of companies, which developed the structures as part of its research program.

Crystallography—The International Union of Crystallography will hold a symposium on "Structure on a Scale Between the Atomic and Microscopic Dimensions" in Madrid, Spain, Apr. 2 through 7, 1956. The Fourth General Assembly and International Congress of the I.U.Cr. will be held at McGill University, Montreal, in July 1957.

Expanding—Marquardt Aircraft Co. is expanding its ceramic and cermet research and development program in search of materials to withstand high temperatures of sustained supersonic flight.

Oak Ridge Courses—Oak Ridge Institute of Nuclear Studies has announced a 12-months schedule of four-week courses in the basic techniques of using radio-isotopes in general research work, and special and advanced courses which stress applications of radio-isotopes in specific fields of scientific endeavor. Further information from: Ralph T. Overman, Special Training Div., Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.

Review Courses—Penn State University has announced a series of review courses for engineers in preparation for professional examinations. Classes are informal, with emphasis on phases of the technical areas in which class members feel the most need for help. Courses may be organized in any community of the State where there is sufficient need. Arrangements will be made by the Penn State Center in the area.

Research Lab—Alloy Rods Co. has opened a new research and development center devoted exclusively to product research and control.

Engineering Grants—Engineering Foundation, which administers the income from a $1,500,000 fund dedicated to the stimulation of engineering research, will advance 26 projects covering a wide range of research being carried out in university laboratories all over the country under sponsorship of the major engineering societies.

Compliments

To EDGAR C. BAIN, vice-president, research and technology, U. S. Steel Corp., on being selected to deliver the Eighth Hatfield Memorial Lecture of the Iron and Steel Institute, England. Dr. Bain will talk on "Trends in Metallurgical Research in the U. S."

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To HERBERT W. GRAHAM, consultant to the president, Jones & Laughlin Steel Corp., on being honored by having the new $1,500,000 J & L's research laboratory named after him. The citation read: "The Graham Laboratory for Jones & Laughlin Steel Corp. was named in honor of Herbert W. Graham, whose long career with the company is a symbol of devotion to the progress of his company, the encouragement of its scientists and engineers, and the broad development of industrial research". Mr. Graham is a member of the Pittsburgh Chapter.

IMPORTANT MEETINGS

for December

Dec. 5-9—Chemical Industries. 25th Exposition, Convention Hall, Philadelphia. (E. K. Stevens, Manager, International Exposition Co., 480 Lexington Ave., New York 17).

Dec. 9-12—American Institute of Chemical Engineers. Annual Meeting, Statler Hotel, Boston. (F. J. Van Antwerpen, Executive Secretary, A.I.C.E., 25 West 45th St., New York 36).

Dec. 10-16—International Atomic Exposition and Nuclear Engineering and Science Congress, Public Auditorium, Cleveland. (Engineers Joint Council for 26 Engineering and Scientific Groups, 29 West 39th St., New York 18).

Dec. 20-22—Indian Institute of Metals. Ninth Annual General Meeting, Calcutta. (M. S. Thacker, President, I.I.M., 31 Chowringhee Rd., Calcutta 16, India.)

Dec. 20-Feb. 27—Dominican Republic International Fair for Peace and Progress, Ciudad Trujillo, Dom. Rep. (Dominican Republic Information Center, 507 Fifth Ave., New York 17)

Meet Your Chapter Chairman

Paul T. Kelley

William R. Smith

R. H. Van Pelt

PEORIA

RICHARD H. VAN PELT, supervising metallurgist, Caterpillar Tractor Co., is a native of St. Louis, Mo. He graduated from the University of Illinois in 1943 with a B.S. degree in metallurgical engineering. Following graduation, Mr. Van Pelt joined the Navy and served for three years aboard the U.S.S. Wasp as an engineering officer. Van has been employed in the research department at Caterpillar since 1946.

Van and his wife have two children. He is also a member of A.I.M.E. and has served on various committees of the Peoria Chapter A.S.M. He is active as a Cub Scout leader. His present off-work interests are fishing and stamp collecting.

BRITISH COLUMBIA

JOHN STOKES, managing director of the Throwaway Bit Co., is a native of Scotland. He was educated at Airdrie Academy and Glasgow Technical School. His first job on leaving school was with the Calderbank Steel Co. in Scotland. He served as artificer in the Royal Navy during World War I.

At the termination of hostilities, John joined the S.K.F. Co. in Montreal as sales engineer in their mining division. Fifteen years later he became associated with Sorel Steel Co. as manager of the mining division. After six years he joined the Atlas Steel Co. as manager, mining division, holding the position for 12 years. During his association with Atlas, he spent two years in South Africa in their interests. He joined Throwaway Bit in 1950.

Mr. Stokes, a charter member and international counsellor of Lions International, and a Freemason, is a keen golfer and photographer.

MAHONING VALLEY

PAUL T. KELLEY, chief control and development metallurgist for U. S. Steel Corp., in the Youngstown district, graduated from Case Institute of Technology with a degree in metallurgical engineering in 1940. He became associated with U. S. Steel the same year as a metallurgical observer, and has held several different posts with the company leading to his present position.

COLUMBIA BASIN

"If I couldn't be a one-armed welder, at least I could be a one-armed welding consultant". With these words, WILLIAM R. SMITH, head, corrosion and welding, General Electric Co., disabled combat veteran of World War II and former expert welder, describes how he began the career at G.E.'s Atomic Energy Commission plant in Richland which led to his present position as a welding consultant and a top man in the metallurgy development section.

Bill lost his left arm in combat on Saipan. Before the war, he had been a welder in the regular Navy, specializing in work on submarines. He had intended to serve one hitch in the Navy and save enough money to return to his studies at the University of California, but the war interrupted his plans. He completed his schooling at University of California after his discharge and graduated with a B.S. degree in metallurgy. He was hired right out of college by General Electric and has continued to advance in his field since he started.

Bill, who likes hunting, baseball and fishing, is a member of Rotary and Kiwanis, and treasurer of the Little League Baseball Team. He is married and is the father of two small children.

Briefs Baltimore Members on Salt Baths

A. F. Holden, President, A. F. Holden Co., at Left, Is Shown as He Discusses His Talk on "Salt Baths—A Tool for Heat Treatment and Surface Preparation of Metals" With Several Members of the Baltimore Chapter

Speaker: A. F. Holden

The A. F. Holden Co.

A. F. Holden, president, The A. F. Holden Co., spoke on "Salt Baths—A Tool for Heat Treatment and Surface Preparation of Metals" at a meeting held recently by the **Baltimore Chapter.**

Mr. Holden covered the original use of salt baths, starting basically in the early 1920's.

The specific points brought out during the discussion covered the improvements and chemical control of salt baths having many fields of application, some of the newer fields being desanding and descaling. Slides were shown to illustrate the various applications of salt baths.

The wide use of marquenching and some of its inherent benefits on physical properties were discussed. The salt bath annealing of ductile iron was explained and its value to short cycle operation pointed out.—**Reported by John S. White for Baltimore Chapter.**

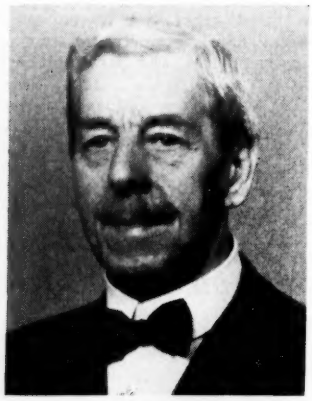
Frank P. Gilligan, past-president A.S.M., has asked us to help him locate copies of METAL PROGRESS, either bound or unbound, to replace copies (from No. 1 through 1954) lost during the recent floods in Hartford, Conn.

Any member or reader who has knowledge of such copies should contact Mr. Gilligan at the Henry Souther Engineering Co., 11 Laurel St., Hartford 6, Conn.

OBITUARIES

ADOLPH W. MACHLET, industrialist and inventor of more than 60 processes in the metallurgical field, died late in September at the age of 90. Mr. Machlet was chairman of the board of directors of the American Gas Furnace Co. He was also president, treasurer and a director of its subsidiary, the American Metal Treatment Co., which he helped to establish in 1907.

Mr. Machlet, who was born in Pforzheim, Germany, came to this country in 1870, attended school in Elizabeth, N. J., and at 14 joined his father in the firm of G. W. Machlet,



A. W. Machlet

which the father founded in 1874 to make tools and supplies for jewelry manufacturers. The company began making furnaces in 1878 and was incorporated nine years later.

Mr. Machlet, who was largely self-educated in the metallurgical field, patented a process for gas case-hardening and a machine which cheapened and improved the case-hardening process and bettered working conditions in heat treating departments. He held patents for many other processes in the heat treating and carburizing field. He holds the Edward Longstreth Medal of the Franklin Institute, the Modern Pioneers Award of the National Association of Manufacturers and the Albert Sauveur Achievement Award of the American Society for Metals.

During the National Metal Congress and Exposition recently held in Philadelphia, Mr. Machlet was posthumously awarded the distinguished service award of the Industrial Division of the Gas Appliance Manufacturers Association.

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AARON B. BAGSAR, chief metallurgical engineer for the Sun Oil Co., died at the age of 58 at his home early in October. A native of East Turkey, Dr. Bagsar came to this country in 1921. In 1924 he received a B.S. degree at the University of California, in 1925, a M.S. degree from University of Idaho, and a year later a Ph.D. degree from Columbia University. Dr. Bagsar also served on a special subcommittee on materials for the American Bureau of Shipping.

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FRANK N. SATTER, a member of the Cleveland Chapter, and a veteran of over 40 years in the steel industry, died in Cleveland late in September.

Mr. Satter began his career in 1912 with Carnegie Steel Co. During World War I, from headquarters at Youngstown Sheet & Tube Co., in Youngstown, Ohio, he supervised inspection of all shell steel produced in the Mahoning Valley for the French Government. After the war he was placed in charge of the billing department at Youngstown Sheet & Tube. Subsequently, he joined the Bethlehem Steel Co. sales department in Cleveland.

Mr. Satter retired in 1953, at which time he was district sales manager for Midvale in Cleveland.

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HAROLD N. ARBUTHNOT, 64, assistant to the president of the Allegheny Ludlum Steel Corp., and past-chairman of the Washington Chapter A.S.M., suffered a heart attack and died in Washington last month.

Mr. Arbuthnot had been a steel sales executive for 30 years. Early in his career he was with a steel company in Ohio but most of his professional life was spent with Allegheny Ludlum.

Mr. Arbuthnot, a native of East Liverpool, Ohio, attended Washington and Jefferson College.

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JOHN E. WALKER, another member of the Washington Chapter A.S.M. and a member of its executive committee, died of injuries received in an automobile accident. Mr. Walker, an Army Ordnance metallurgist at the Pentagon, suffered a fractured skull after the car in which he was a passenger collided with another auto.

Mr. Walker, a World War II Navy veteran, was a lieutenant commander in the active Naval Reserve. A native of York, Pa., he graduated from Rensselaer Polytechnic Institute and entered the Navy in 1942, when he went to Washington to work in the Navy Bureau of Ships' Research and Development Laboratory. He volunteered for combat duty in 1944 and served with the Seabees as a construction officer in the Pacific for a year before returning to his Navy job. In 1948 he transferred to Army Ordnance.

Mr. Walker was 42 years of age at the time of his death.

New Films

Mining for Nickel

The complete story of nickel mining, the latest in a series of motion pictures sponsored by the International Nickel Co., Inc., gives a clear picture of the complicated underground workings of a great mining operation. Sequences of cleverly defined animation, coupled with live-action photography, present a comprehensive picture of the mining of nickel, from the search for ore and the way it is located through the basic development of a mine and the six different methods used to extract the ore. The film, which is in color, runs for 55 min. Write to: Rothacker, 729 7th Ave., New York 19, N. Y.

Tells How to Build Better Mousetraps at Hartford

Speaker: Harry I. Dixon

Metallurgical Products Co.

The **Hartford Chapter** heard Harry I. Dixon, president, Metallurgical Products Co., speak on the intriguing subject "How to Build Better Mouse Traps".

The point of Mr. Dixon's remarks was that many people using castings in the manufacture of their products have never come beyond the stage of thinking in terms of the old sand casting methods. He presented a series of slides illustrating latest developments of various other methods such as permanent mold casting, lost wax investment casting and Mercasting. He was careful to point out the attributes and shortcomings of each method and showed samples of work his company has done in this field.

The meeting closed with a question and answer period led by Richard Litner, technical chairman for the evening.—**Reported by Gordon W. Hunt for Hartford Chapter.**

Production of Saw Chain Is Subject at Oregon Meeting

Speaker: Everett H. Lillig

Oregon Saw Chain Corp.

At a meeting of the **Oregon Chapter,** Everett H. Lillig, plant manager, Oregon Saw Chain Corp., talked on the "Production of Saw Chain".

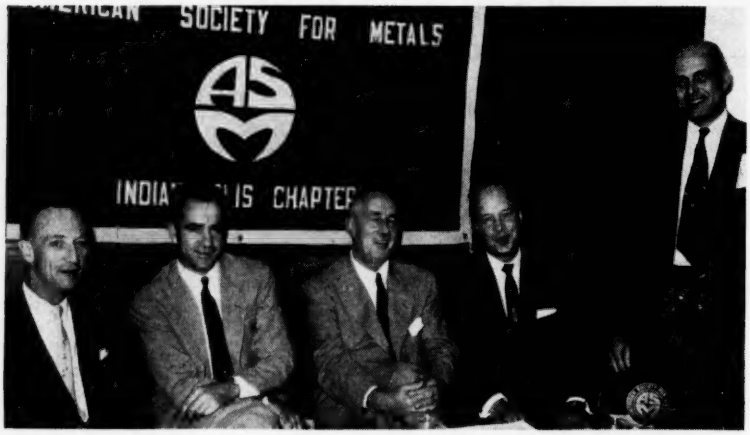
The manufacture of saw chain has revolutionized the logging industry, according to Mr. Lillig. The production of saw chain started in 1947 with one man in a basement workshop. Today, 300 employees work in a new, air conditioned, completely modern manufacturing plant. Mr. Lillig concluded by explaining the importance of the company's employer-employee relations.

After the technical meeting, members of the Chapter toured the Oregon Saw Chain Co.—**Reported by Theodore B. Mathisen for Oregon.**

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Calumet	Dec. 13	Phil Smidt	Clyde Furgason	Modern Impact Forging
Canton-Massillon	Dec. 6	Mergus Restaurant	H. P. Barringer	Quality Control Methods in Steel Manufacturing
Chattanooga	Dec. 20	Maypole Restaurant	Social	Dinner-Dance
Cleveland	Dec. 5	Aluminum Co. of American	J. H. Dunn	Aluminum Alloys in the Auto Industry
Columbia Basin	Dec.		Social	Christmas Party
Dayton	Dec. 12		Panel	Heat Treat Problems
Des Moines	Dec. 13	Breeze House	Social	Christmas Party
Detroit	Dec. 5	Elmwood Casino	Social	Christmas Party
Eastern New York	Dec. 13	Edison Club	Social	Christmas Party
Fort Wayne	Dec. 12		L. F. Busch	Titanium
Golden Gate	Dec. 12	Pland's Restaurant	G. H. Kissin	Decorative and Protective Finishes for Aluminum Alloys
Hartford	Dec. 9	Avon Country Club	Social	Christmas Party
Indianapolis	Dec. 12	Western Electric Co.		Plant Visit
Jacksonville	Dec. 12	Liddy's Machine Shop	Panel	Best Process for Reclamation of Worn Parts
Kansas City	Dec. 3	Pickwick Hotel	Social	Christmas Party
Louisville	Dec. 6	White Cottage Restaurant	John W. Hood	Quality Control in the Aluminum Industry
Mahoning Valley	Dec. 13	Post Room, V.F.W.	L. S. Busch	Titanium
Milwaukee	Dec. 2	Elks Club	Social	Christmas Party
Minnesota	Dec. 9	Calhoun Beach Hotel	Social	Christmas Party
Montreal	Dec. 5	Queen's Hotel	C. H. Sample	Corrosion Behavior and Protective Value of Electrodeposited Metallic Coatings
Muncie	Dec. 13	Anderson		Electron Metallography
New Jersey	Dec. 12	Essex House	Social	Christmas Party
New Orleans	Dec. 20			Civilization Through Tools
New York	Dec. 5	Hotel Victoria	J. C. Fox	Die Casting
Northeast Pennsylvania	Dec. 8	Irem Temple Country Club	Robert Nycum	Application and Metallurgy of Titanium and Its Alloys
Oak Ridge	Dec. 8	University of Tennessee		Civilization Through Tools
	Dec. 10		Social	Christmas Dinner-Dance
Ontario	Dec. 2	Royal York, Toronto	John Convey	New Metals Development and Canada Becomes of Age Metallurgically
Oregon	Dec. 16	Congress Hotel	Social	Christmas Party
Ottawa Valley	Dec. 6	P.M.R.L.	G M. Young	History of Aluminum Alloy Development
Peoria	Dec. 13	New Legion Bldg.	A. O. Schaefer	Application of Emergency Metallurgy to Peacetime Work
Philadelphia	Dec. 9	Penn Sherwood Hotel	Social	Christmas Party
Jr. Section	Dec.		Social	Dinner-Dance
Pittsburgh	Dec. 9	Vogue Terrace	Social	Christmas Party
Puget Sound	Dec. 14	Engineers Club	Social	Christmas Party
Purdue	Dec. 13	Purdue Memorial Union	M. E. Nicholson	Effects of Boron in Austenitic Transformations
Quebec	Dec. 12	Laval University	Paul E. Gagnon	Recent Advances in Extractive Metallurgy of the Rarer Metals
Rhode Island	Dec. 7	Johnson's Hummocks	M. B. Bever	Effect of Gases in Metals
Rochester	Dec. 12	Howard Johnson's	W. G. Johnson	Residual Stresses Arising From Heat Treatment and Castings
Rockford	Dec. 14	Barber-Colman Cafeteria	Social	Christmas Party
Rocky Mountain Denver	Dec. 16	Oxford Hotel	C. E. Betz	Penetrant Inspection
Syracuse	Dec. 6	Onondaga Hotel	R. R. Tatnall	Wire
Texas	Dec. 6	Ben Milam Hotel	F. J. Robbins	Lead Bearing Steels
Tri-City	Dec. 13	Rock Island Arsenal	A. O. Schaefer	Application of Emergency Metallurgy to Peacetime Work
Tulsa	Dec. 6		Hiram Brown	High-Temperature Alloys and Coatings for High-Temperature Use
Utah	Dec. 17	Hotel Newhouse	Social	Christmas Party
Warren	Dec. 8		Social	Christmas Party
Washington	Dec. 12	National Airport	W. J. Harris, Jr.	Metallurgical Failures in Welded Ships
West Michigan	Dec. 19	Lock's Restaurant	Panel	Metal Protection
Western Ontario	Dec. 9	Windsor	Panel	Stump the Experts
York	Dec. 14	Lancaster	T. O. Paine	Magnetic Materials

Panel Reviews Carbon Control



Speakers at the Panel Discussion Presented by the Indianapolis Chapter on "Controlled Carbon Carburizing and Restoration" Were, From Left: O. E. Cullen, Surface Combustion Corp.; W. T. Groves, Dana Corp.; A. S. Jameson, International Harvester Co.; and W. L. Besselman, Leeds & Northrup Co. E. E. Tuttle, right, vice-chairman of the Chapter, moderated the meeting

The **Indianapolis Chapter** opened the 1955-1956 season with a panel discussion on "Controlled Carbon Carburizing and Restoration". Panel members were:

Wilson T. Groves, metallurgical engineer, Dana Corp.

A. S. Jameson, supervisor of metallurgical research laboratories, International Harvester Co.

O. E. Cullen, chief metallurgist, Surface Combustion Corp.

W. L. Besselman, section head in charge of development and production engineering on heat treating furnaces, Leeds and Northrup Co.

E. E. Tuttle, vice-chairman, was moderator of the discussion.

W. T. Groves discussed "Carbon Control in Gas Carburizing". In normal carburizing, the maximum surface carbon concentration is limited to saturated austenite indicated by the A_{cm} line of the iron-carbon diagram.

Some of the advantages in controlling the furnace atmosphere to produce surface carbon concentrations below saturated austenite are: (1) To obtain case hardenability, particularly with low alloy steels; (2) to permit the economy of direct quenching work from the carburizing furnace instead of reheating; and (3) to permit the use of a furnace atmosphere low in hydrocarbon addition.

A. S. Jameson, who spoke on "The Effect of Decarburization on the Static and Dynamic Properties of Steel Parts", stated that the main facts at the present time are: Decarburization lowers the fatigue strength in bending and tension; if the decarburization is heavy, the static tensile strength is lowered; the depth of decarburization is not too significant in bending fatigue as any amount is almost equally detrimental; carbon restoration improves the fatigue strength in bending or tension; carbon restoration cannot be employed to improve fatigue strength where decarburization proceeds to the point of grain boundary oxidation; carbon restoration can be used to improve static tensile strength even though grain boundary oxidation exists; and the carbon level in restoration is an important consideration where it affects ductility.

In a discussion on "Equipment", O. E. Cullen pointed out that there are several different processes for carburizing and the type of equipment will vary greatly with change in process.

Pack carburizing requires furnaces of rather simple direct-fired design, either batch-type or continuous, and of rugged construction with uniform heating arrangement. The atmosphere is controlled by the type of carburizing compound and the technique of mixing fresh and used compound to provide correct carburizing potential.

Salt bath carburizing involves the matter of furnace design. Heating is provided either by submerged heating elements or by externally applied fuel burners. In the same case of submerged elements the problem of corrosion by oxidation and carburization must be taken care of. Externally heated salt pots must be designed to withstand flue gas corrosion, must be protected from burner flames, and of design to avoid splashing of molten salt out on the furnace lining. Salt pots may be of steel or alloy depending upon the temperature of use and the service life desired.

Gas carburizing is by far the more commonly used method. In this case the design of the furnace, whether batch-type or continuous, becomes at least as important as the selection and control of the type and analysis of the atmosphere used in the furnace. The atmosphere for controlled carbon heat treatment is generally of the exothermic type containing approximately 20% CO, 40% H_2 and 40% N_2, with the dewpoint of this gas kept at a suitable value to permit establishing of a correct carbon balance in the furnace.

The furnace equipment required for carbon controlled atmosphere use must necessarily be gas tight, with particular attention being paid to the mechanical features required to operate the furnace under these tight conditions.

In batch-type furnaces, atmosphere may be varied during different portions of a heat treating cycle and this is done strictly on a time-cycle basis. In continuous furnaces, atmosphere must be varied in different zones of the furnaces to accomplish the same end result. This is being done on a large scale today by proper design of the furnace and auxiliary equipment.

In his talk on "Instrumentation for Carbon Control", W. L. Besselman stated that specifications and metallurgical requirements have become so rigid that the use of indicating devices only is rapidly becoming obsolete. What is definitely required now is continuous measurement and control of the atmosphere composition on carbon potential.

The problem is the production of suitable analyzers which will produce a voltage or a resistance output signal that can be suitably recorded.

Mr. Besselman pointed out the principles of operation of the dewpoint analyzer, which are: Condensation of water on a cooled or polished metal or mirror surface, available as an indicator or recorder; formation of fog by sudden expansion of compressed gas—this is available as an inductor only so that its use is limited to making spot checks; and change in resistivity of salt compounds by moisture variation, available as a recorder controller.

Infra-red analyzers operate on the selective absorption of infra-red energy and utilize two fundamentals, namely: Each gas compound absorbs a certain portion of infra-red radiation that no other gas absorbs; and the amount of radiation absorbed is proportional to the concentration of the gas compound.—**Reported by Dorothy Holbrook for Indianapolis.**

As an indication of the tremendous dissemination of engineering information, a compilation shows that in one year the ASM collected, edited, published and distributed over *one hundred million pages* of metallurgical information.

Aircraft Men on Construction Panel

Panel Members Who Held a "Symposium on High-Temperature Sandwich Panels" at a Meeting of the San Diego Chapter Included, From Left: E. F. Mellinger, Ryan Aeronautical Co.; W. F. Bunsen, Rohr Aircraft Corp.; E. E. Hardesty, American Helicopter Division of Fairchild; John Long, Solar Aircraft Co.; Herb W. Hinckley, Convair-Ft. Worth Division; and Leo Schapiro, Douglas Aircraft Co. (Photograph by John Crane for San Diego)

Representatives of six aircraft companies presented a "Symposium on High-Temperature Sandwich Panels" at a meeting held by the **San Diego Chapter.** Panelists were: Herb W. Hinckley, assistant chief engineer for product design, Convair-Fort Worth Division; John Long, director of research, Solar Aircraft Co.; William F. Bunsen, design engineer on research and development, Rohr Aircraft Corp.; E. F. Mellinger, assistant to vice-president of manufacturing, Ryan Aeronautical Co.; and E. F. Hardesty, manager, plastic research plant, American Helicopter Division of Fairchild. Leo Schapiro, chief metallurgist, Douglas Aircraft Co., was moderator.

Mr. Hinckley described the problems which honeycomb construction was designed to solve. He said that at speeds faster than three times the speed of sound, steels are the only metal that stand the heat. He stated that wing surfaces are expected to heat to 1200° at four times the speed of sound. The sandwich construction would give needed strength with lightness even with the use of steel.

The other panelists discussed the problem of bonding the honeycomb and faces. Mr. Long and Mr. Bunsen told of the experiences of their companies in using brazing to do the job. Mr. Mellinger and Mr. Hardesty advocated the use of resistance welding, which is a newer and less-tried method of bonding.

The speakers agreed that the art of making steel honeycomb sandwiches, still needing perfecting for manufacturing purposes, would be ready for superspeed aircraft of the future.

The "honeycombs" are made of foil-like metal sandwiched between flat metal sheets. The resulting material, extremely light and strong, is used for wings, control surfaces and other parts of aircraft.—**Reported by T. E. Piper for San Diego.**

A.S.M. Sponsoring Program Of Literature Searching

Adoption of methods of automation to the handling and searching of metallurgical literature is the object of an experimental program recently adopted by the American Society for Metals. The need for better methods of retrieving and correlating metallurgical literature is urgent, since the time is rapidly approaching when it will be almost cheaper to do a research job than to spend the time, effort and money required for literature search by conventional library and subject indexes.

The A.S.M. is therefore sponsoring a pilot operation to test the feasibility and utility of computing-type equipment for this purpose. Experimentation in these methods has been going on in various fields of science and technology for some time, but this will be the first full-scale pilot operation to be undertaken.

It is estimated that the experimental phase will require from three to five years and will involve the indexing of 25,000 literature items before it can be definitely determined whether these automatic methods will produce the time and labor-saving results anticipated.

The pilot operation will be conducted under a contract with the Center for Documentation and Communication Research at the School of Library Science of Western Reserve University, and will be directed by J. W. Perry, director of the Center, Allen Kent, associate director, and Jesse H. Shera, dean of the School of Library Science. A small committee of A.S.M. members will act in an advisory and supervisory capacity. Chairman of this committee is D. C. Hilty of Metals Research Laboratory, Electro Metallurgical Co.

The group at Western Reserve will conduct the experimental phase of the program only; the operation of a literature correlating and searching service will be under the direct control of the Society.

If this pioneering venture is successful, A.S.M. will be in a position to offer an effective new service to its members and to the metals industry. This forward-looking attempt to solve a problem universally regarded as of utmost seriousness is in keeping with the progressive history of the A.S.M. and will blaze the way for coordinated work in other fields of knowledge.

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1957 *Transactions* and possible presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 38th National Metal Congress and Exposition to be held in Cleveland Oct. 8-12, 1956. All papers that are accepted will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 2, 1956.

Acceptance of a paper for publication does not necessarily infer that it will be presented at the annual convention. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Should it be your intention to submit a paper, please notify A.S.M. A copy of the booklet entitled "Suggestions to Authors in the Preparation of Technical Papers" will be gladly forwarded. This booklet may help considerably in the preparation of line drawings and illustrations.

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

151-A. A Case Study in a Heavy Foundry. J. Souter. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Aug. 1955, p. 2-7 + 6 plates; disc., p. 7-10.

General shop layout, detailed analysis of operations and movements, and feasibility of introducing incentive wage payments studied in a heavy core shop attached to a jobbing foundry. Improvements are given in detail. (A5, E general, CI)

152-A. European Iron and Steel. Charles F. Goodeve. *Canadian Metals,* v. 18, Sept. 1955, p. 23-26.

A United Nations' survey projects a bright future for Western European iron and steel based on rapid development of new techniques in recent years. Photographs. (A4, Fe, ST)

153-A. British Steel Castings Research Association. Second Annual Report, Covering the Period April 1, 1954, to March 31, 1955. *Foundry Trade Journal,* v. 99, Sept. 1, 1955, p. 241-250.

Summarizes status of sponsored research projects investigating molding materials, foundry processes, industrial hygiene and properties of steel castings. Photographs, diagrams, graphs. (A9, E general, CI)

154-A. Industrial Hygiene of Uranium Processing. M. Eisenbud and J. A. Quigley. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/85, July 1955, 17 p.

Radiation hazards have been overcome. Severe exposures to both soluble and insoluble uranium have shown it to be less injurious chemically than severe exposures to nonradioactive heavy metals such as lead, arsenic and mercury. Tables, graphs. 9 ref. (A7, C general, U)

155-A. Maximum Permissible Exposure Standards. Robert S. Stone. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF. 8/P/89, June 1955, 14 p.

Since certain radiation effects are irreversible and cumulative, it is strongly recommended that exposures to all types of ionizing radiations be kept at a minimum. Tables. 23 ref. (A7, U)

156-A. Mechanism of Uranium Poisoning. H. C. Hodge. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/73, July 1955, 7 p.

Uranium is hard to absorb into the body. If absorbed, it injures the tissues of the kidney by blocking carbohydrate metabolism in the cells. 1 ref. (A7, U)

157-A. Savings Pay for Chip Processing System. Herbert Chase. *Iron Age,* v. 176, Sept. 15, 1955, p. 138-140.

Cleaned and crushed chips are blown directly into freight cars. Cutting oil recovery is about 80%. Photographs. (A8, CI, ST)

158-A. (Polish.) **Recovery of Iron From Slag Piles.** Zdzislaw Kotas. *Wiadomosci hutnicze,* v. 11, no. 5, May 1955, p. 130-134.

Demand for steel, exhaustion of mines and need for terrain covered by slag piles are causing greater interest in recovery methods, slag analyses and processing. Diagrams. (A8, B21, Fe)

159-A. (Russian.) **Utilization of Aluminum Refining Waste Red Slurry for Removing Hydrogen Sulfide From Gas.** F. P. Ivanovskii, V. A. Dontsova and T. A. Semenova. *Khimicheskaia promyshlennost',* 1955, no. 4, June, p. 218-222.

Chemical compositions of the slimes; equipment for purifying the gases; relation of sulfur capacity of slurry to carbon dioxide content of gas, temperature and other factors. Graph, diagram, tables. 8 ref. (A8, Al)

160-A. (Russian.) **Contemporary State of the Reprocessing and Use of Steel Chips.** E. M. Guzev. *Stal',* v. 15, no. 7, July 1955, p. 639-645.

Sorting, combining and briquetting methods for steel chips; remelting and type of heat treatment is governed by chip composition. Diagrams, tables, graphs, photographs. (A8, B17, ST)

161-A. Hot Laboratory Facilities and Techniques for Handling Radioactive Materials. S. E. Dismuke, M. J. Feldman, G. W. Parker and Frank Ring, Jr. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/723, June 1955, 42 p.

Configurations of laboratory building and shielding structure, remote operating contrivances and some interesting operations. Diagrams, photographs. 11 ref. (A9, A7)

162-A. Youngstown in Chicago. T. J. Ess. *Iron and Steel Engineer,* v. 32, Sept. 1955, p. 2Y-26Y.

Discusses Youngstown Sheet and Tube Co. plant in Chicago area. Photographs, diagrams, tables. (A5, D general, ST)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

163-A. General View of American Metallurgy. Zay Jeffries. *Metal Progress,* v. 68, Sept. 1955, p. 74-76.

Although satisfaction can be obtained by contemplating the progress that has been made in metallurgy, workers in the field are faced with a challenge greater than any of the past. Great future opportunities await along the road toward atomic energy. (A general)

164-A. Metallurgical Education, 1955. Austen J. Smith. *Metal Progress,* v. 68, Sept. 1955, p. 110-112, 186, 190.

Metals engineers are becoming scarcer as industry needs more, yet universities receive fewer qualified candidates. One solution suggested is greater professional consciousness. (A3)

165-A. Recovering Uranium as By-Product in Phosphate Processing. James A. Barr, Jr., John W. Ruch and Ralph F. Borlik. *Rock Products,* v. 58, Oct. 1955, p. 96, 98, 100, 102.

Problems and possibilities of recovering uranium from phosphoric acid and phosphate fertilizers. Photographs, chart. (A8, U)

166-A. (English.) **The New Sheet-Iron and Tin-Plate Mills at Ymuiden (Holland).** A. J. Van Walraven. *Acier, Stahl, Steel,* v. 20, no. 9, Sept. 1955, p. 345-351.

Description of buildings. Photographs, diagrams. (A5, F23, Fe, Sn)

167-A. (German.) **The Quality of Remelt Magnesium Alloys.** Karl Ernst Mann. *Giesserei,* v. 42, no. 19, Sept. 15, 1955, p. 515-519.

Cutting and sorting of scrap and effects of metallic and nonmetallic contaminations. Graphs, tables, micrographs. 9 ref. (A8, Mg)

168-A. (Book.) **Fourth Annual Symposium on Hot Laboratories and Equipment.** TID-5280. 383 p. 1955. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $1.75.

Papers cover equipment and methods for chemical, metallurgical, and and nuclear studies. Pertinent papers are individually abstracted. (A9, A7)

169-A. (Book.) **The Reactor Handbook.** J. F. Hogerton and R. C. Grass, editors. v. I. Physics. AECD-3645. 790 p. 1955. Technical Information Service, U. S. Atomic Energy Commission. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. $4.25.

A condensed source of reliable data and reference information relating to nuclear physics, reactor statistics and dynamics, and problems of radiation and radiation shielding. (A general, P general)

170-A. (Book.) **The Reactor Handbook.** J. F. Hogerton and R. C. Grass, editors. v. II. Engineering.

AECD-3646. 1075 p. 1955. Technical Information Service, U. S. Atomic Energy Commission. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. $5.50.

Reactor components; physics and properties of cooling and fuel systems; corrosion problems; reactor designs. (A general, P general, R general, T25)

171-A. (Pamphlet-French.) **Aluminum and Plastic Materials. Development of Two Modern Materials. Aluminium et metiéres plastiques. Développement de deux matériaux modernes.** Raoul de Vitry. 12 p. 1955. Société d'Encouragement Pour l'Industrie Nationale, 44 Rue de Rennes, Paris, France.

General historical sketch, emphasizing French production. (A2, Al)

172-A. (Book-German.) **Reactions in and With Solids. Reaktionen in und an festen Stoffen.** Karl Hauffe. 696 p. 1955. Springer-Verlag, Berlin, Germany.

Irregularities in ion and electron semiconducting crystals and their influence on the electrical behavior of ions and valency crystals. Data on the crystals, boundary layer phenomena, chemisorption of gases and solids, diffusion in solids, oxidation reactions in metals and alloys, mechanism of ion compounds of higher order through reactions in solid condition, and on reduction and roasting processes. (A general)

B

Raw Materials and Ore Preparation

167-B. Vitro's Keys to Successful Uranium Leaching. J. B. Huttl. *Engineering and Mining Journal,* v. 156, Sept. 1955, p. 100-105.

Refining process includes ore preparation, sulfuric acid leaching, decantation and clarification, precipitation, filtration and refining. Photographs, diagram. (B13, B14, U)

168-B. Canadian Practice in Ore Dressing and Extractive Metallurgy of Uranium. A. Thunaes. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/2, June 1955, 9 p.

Canadian ores being treated do not contain other values in sufficient amount to warrant their recovery and, consequently, the uranium must pay for cost of development, mining and milling. 10 ref. (B general, U)

169-B. Metallurgical Coke 1939-1955. J. Taylor. *Iron & Steel,* v. 28, Sept. 1955, p. 431-435.

Critical review of literature covering quality and properties of coke and its use in blast furnaces and cupolas. 65 ref. (B22, D1, E10)

170-B. Iron and Steel Produced From Pyrrhotite Tailings Opens Up Potential Market. B. G. Hunt and A. Turner. *Journal of Metals,* v. 7, Sept. 1955, p. 944-947.

Iron sulfide concentrate, produced in separating lead and zinc from ore, is roasted to provide sulfur dioxide, and the iron oxide calcine is turned into pig iron. Photographs, tables. 1 ref. (B14, B15, Fe, ST, EG, Zn, Pb)

171-B. Ore Blending at Shipping Dock Insures Uniform Blast Furnace Burden. Myron W. Griswold. *Journal of Metals,* v. 7, Sept. 1955, p. 956-969.

Because Minnesota ores are not uniform, methods of sampling from railroad cars and blending combination grades in cargo boats have been devised. Photograph, diagrams, tables. (B11, D1, Fe)

172-B. The Decomposition of Blast Furnace Raw Materials and Slags, Steelmaking Slags and Refractories for the Purpose of Chemical Analysis. E. W. Harpham. *Metallurgia,* v. 52, no. 310, Aug. 1955, p. 93-101.

Application of methods for decomposition. 144 ref. (B19, B21, D general, ST)

173-B. Aerofall Mill Finds Increasing Application. Rixford A. Beals. *Mining Engineering,* v. 7, Sept. 1955, p. 842-845.

Materials that undergo dry grinding, without balls, include iron and gold ore, asbestos rock and slag. Tables, photographs, flowsheets, diagrams. (B13, Fe, Au)

174-B. (French.) **Contribution to the Study of the Physical Properties of Aluminum Oxides in Relation to the Conditions of Calcination of the Hydrated Alumina.** Lucia Braicovich and Fabrizia Landi. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 17-22; disc., p. 23.

Systematic tests of industrial calcination carried out at various temperatures. X-ray and microscopic examinations made on resultant product. Micrographs, tables, graphs. (B15, Al)

175-B. (Hungarian.) **Behavior of Stabilized Refractory Dolomite in Electric Furnaces.** Antal Szerelmy. *Kohaszati lapok,* v. 10, no. 8, Aug. 1955, p. 366-369.

Characteristics and behavior of furnace linings made with brick of Roumanian origin. Diagrams, tables, graphs. (B19)

176-B. (Russian.) **Effect of Alkali and Soda on the Flotation Properties of Sulfide-Free Minerals.** V. M. Borisov. *Khimicheskaia promyshlennost',* 1955, no. 4, June, p. 213-217.

Effect of pH on variation of electrokinetic potential of calcite, apatite, fluorite, dolomite, barite and others. Graphs, tables. 9 ref. (B14)

177-B. Classification in Hydrocyclones. George M. Darby. *American Ceramic Society Bulletin,* v. 34, Sept. 1955, p. 287-290.

History and development of liquid-solid cyclones and their operation as classifiers. Diagrams, tables. (B13)

178-B. Zirconium Metal Production. S. M. Shelton, E. D. Dilling and J. H. McClain. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/533, July 1955, 128 p.

Current status with a detailed account of production of reactor grade by Bureau of Mines. Tables, graphs, photographs, diagrams, flowsheet. 66 ref. (B general, C general, Zr, Hf)

179-B. Development of Chemical Treatment of Low-Grade Iron Ores at Appleby-Frodingham. L. Reeve. *Iron and Steel Institute, Journal,* v. 181, Sept. 1955, p. 26-40.

Cyclic process for distilling iron as pure ferric chloride, vanadium recovery, fluidizing techniques, thermodynamics and engineering problems. Diagrams, tables, photograph, graphs. 4 ref. (B14, Fe)

180-B. Sintered Ore—New Glow in Blast Furnace Economy. Thomas F. Hruby and Robert M. Love. *Steel,* v. 137, Sept. 26, 1955, p. 112-114.

Sinter plant has been found especially valuable because of need for more blast furnace hot metal, high cost of constructing new blast furnaces, increasing cost of coking quality coals and the forced shift to ores containing high percentages of fines. Photographs, graph. (B16, D1, ST)

181-B. (Czech.) **Ferromanganese.** Rudolf Strubl and Oldrich Sedlacek. *Hutnické listy,* v. 10, no. 8, Aug. 1955, p. 462-469.

Economically compares the more important methods of production of the medium and low-carbon ferromanganese and manganese metal on the basis of the principal production costs (e.g., cost of the ore, the reduction coke, and electrical energy consumption). Map, tables, graphs, diagram. 4 ref. (B22, Fe, Mn)

182-B. (German.) **Limits of De-Phosphorization of Iron With Lime.** Gerhard Trömel and Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 497-506.

Importance of construction of a phase diagram of the iron-phosphorus-oxygen-lime process, and allied difficulties. Role of temperature and of individual components, material of the crucible and slag formation and its constitution. Graphs, tables, phase diagrams, micrographs. 6 ref. (B21, P12, Fe)

183-B. (German.) **Observations on Investigation Methods in Study of Coking Ability of Coal.** Fritz Ulrich. *Gas- und Wasserfach,* v. 96, Ausgabe Gas, no. 17, Sept. 1, 1955, p. 557-560.

Results of experiments conducted by author of coking of different types of coal and their mixtures, with emphasis on the importance of coking coal lump size. Graphs. 6 ref. (B18)

184-B. (German.) **Thermic Aspects for the Use of Carbon Stones for Hearth Block and Hearth Casing of Furnaces.** Reinhold Baake and Joachim Tischendorf. *Metallurgie,* v. 5, no. 4, Apr. 1955, p. 123-127.

Economic use depends on carbon material of low thermal conductivity and high mechanical and chemical qualtity. Tables, diagrams, graphs. 3 ref. (B19, D1, C)

185-B. (German.) **Carbon Stones in Furnaces.** Joachim Holzhey. *Metallurgie,* v. 5, no. 4, Apr. 1955, p. 134-144.

Summary of opinions on usefulness, ways of mounting, cooling and heating newly set-up furnaces. Graphs, photographs, table, diagrams. 15 ref. (B19, D1, C)

C

Nonferrous Extraction and Refining

149-C. Alumina. Kenneth M. Reese and W. H. Cundiff. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 1, p. 1672-1680.

History of aluminum research and production, present methods of obtaining aluminum from alumina. Tables, flowsheet, photographs, diagram. 6 ref. (C general, Al)

150-C. Metallurgy of Thorium. G. E. Kaplan. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/636, June 1955, 7 p. (Translated from the Russian.)

Monazite decomposition by acid and alkali methods and purification of thorium by electrolysis of fused salts with either liquid or solid cathode. Graphs. 4 ref. (C28, C23, Th)

151-C. The Preparation of Uranium Metal by the Reduction of Uranium Tetrafluoride With Magnesieum. H. A. Wilhelm. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/817, June 1955, 28 p.

In the reduction process, magnesium is preferred over calcium since commercial grade offers less contamination, amount required is reduced and cost is lower. Photographs, diagrams, graphs. (C26, U)

152-C. Production of High-Purity Metallic Bismuth. N. P. Sajin and P. Y. Dulkina. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/637, June 1955, 11 p. (Translated from the Russian.)

Investigation of hydrometallurgical and crystallophysical methods. Tables, diagrams. 8 ref. (C28, Bi)

153-C. Production of Uranium Metal. L. Grainger. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/407, June 1955, 6 p.

Possibilities of improving existing processes which would result in producing the metal from concentrates, comparing favorably with other metals in cost, design and purity. (C4, U)

154-C. Separation of Hafnium From Zirconium and Production of Pure Zirconium Dioxide. N. P. Sajin and E. A. Pepelyaeva. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/634, June 1955, 13 p. (Translated from the Russian.)

Outlines separation method by fractional crystallization of zirconium, hafnium and potassium bifluorides. Photographs, graphs, table. 9 ref. (C28, Zr, Hf)

155-C. Sound Uranium Ingots Cast Using Consumable Electrode Arc-Melting. F. R. Lorenz and W. J. Hurford. *Journal of Metals,* v. 7, Sept. 1955, p. 952-955.

Process for successfully producing ingots, by melting derby uranium, is clean and easy to control when remelting uranium previously vacuum-induction melted and cast. Photographs, diagrams. (C5, C21, U)

156-C. Temperature Gradient Zone Melting. W. G. Pfann. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 961-964.

Phenomenon is utilized in fabricating semiconductive devices, growing single crystals, joining, boring fine holes in solids, measuring diffusivities in liquids, small scale alloying and purification. Diagrams, photographs. 9 ref. (C5)

157-C. Slug Feeder for Dissolver. S. O. Lewis. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 347-355.

Design and operating characteristics of a simple hopper, which operates under water, to charge the hydraulic powered feeder tube leading to dissolver. Photographs, diagrams. (C general, U)

158-C. (English.) The Use of Scale Models for Investigating the Effect of Steel Parts on Magnetic Fields in Large Aluminium Furnaces. Oluf C. Bockman. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 151-157.

Basic theory used, construction and operation of the models, representative measurements. Diagrams, photographs, graphs. (C21, Al)

159-C. (English.) The Subhalide Distillation of Aluminium. P. Gross. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 167-171; disc., p. 171.

Basic principles of evaporating aluminum as subhalide and of the production of pure aluminum by this method. Tables. 19 ref. (C4, Al)

160-C. (French.) On a Theory of the Structure of Metallic Oxides of the M_2O_3 Type Dissolved in Fused Salts. Georges Petit. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 45-49; disc., p. 49.

Results given by cryoscopic study of oxides of the M_2O_3 type, in cryolite and cryolite-sodium fluoride eutectic at high temperatures when applied to alumina, give a satisfactory theory of the electrolytic reduction of aluminum. Graphs. 13 ref. (C23, Al)

161-C. (French.) Contribution to the Study of the Molecular Condition of Aluminum, Magnesium and Beryllium Oxides Dissolved in Fused Fluorides, by Cryoscopy in Pure Sodium Fluoride, in the Sodium Fluoride-Potassium Fluoride Eutectic and in Cryolite. Maurice Rolin. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 51-61; disc., p. 61.

Results obtained in sodium fluoride—potassium fluoride eutectic, and a high solubility; and in pure sodium fluoride, and a low solubility. Graphs, tables. 24 ref. (C4, Al, Be, Mg)

162-C. (French.) Preparation of a Calcium-Aluminum Alloy and Its Use as a Reducing Agent of Titanium Dioxide. André Chrétien, William Freundlich, Michel Bichara and Gilbert Tourné. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 103-106.

By its oxidation with a preferred formation of $5CaO{\cdot}3Al_2O_3$ and liberation of aluminum, it can reduce the refractory oxides with direct formation of aluminum alloys with the metal of the used oxide. Radiograms, graphs, tables. (C26, Al)

163-C. (French.) Preparation of Calcium From Calcium Carbide by Means of Aluminum. Pierre Vignial. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 107-109.

Experiments carried out on samples at temperature from 1150 to 1250° C. under 10^{-3} mm. mercury. About 80% of the total calcium processed was extracted; recovered portion, in bulk, contains more than 96% metallic calcium. Tables. 12 ref. (C26, Al, Ca)

164-C. (French.) The Development of Baths for the Electrolysis of Aluminum From Sainte-Claire DeVille to the Present Time. Alfred von Zeerleder. Paper from "Congrés International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 115-121.

History of development of baths for the electrolytic production of aluminum. Diagrams, photographs, table. (C23, Al)

165-C. (French.) Where Do We Stand in Our Knowledge of the Theory of the Electrolysis of Aluminum? A. Vajna. Paper from "Congrés International de l'Aulminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 123-130; disc., p. 130.

Results in theoretical and experimental research regarding aluminum electrolysis which have been published in scientific literature during recent years in Europe and America. Graphs, photographs. 28 ref. (C23, Al)

166-C. (French.) On the Electrochemical Series of Metals in Fused Alkali Fluorides. Kai Grjotheim. Paper from "Congrés International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 131-136.

Experimental determination, at 850° C., of the relative position in the electrochemical series of aluminum, manganese, chromium and nickel dissolved in the fused eutectic mixture of sodium and potassium fluorides. Photographs, tables, diagrams. 6 ref. (C23, C4, Al, Cr, Mn, Ni)

167-C. (French.) Thermodynamic and Experimental Contribution to Electrometallurgy of Aluminum. Marc van Lancker. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 137-141; disc., p. 142.

Use of generalized thermodynamic interpretation of cryoscopic phenomena (liquidus and solidus equilibria) and introduction of some data from crystallographic stereochemistry, to get a clear idea of structural ionic characteristics of the electrolyte in the molten state. Micrograph, graph, X-ray diffractogram. 10 ref. (C23, Al)

168-C. (French.) Electrolysis of Aluminates. Etienne Bonnier. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 159-165; disc. p. 165.

Methods of electrolyzing the aluminates which have been developed and the practical and theoretical results obtained. Tables. 7 ref. (C23, Al)

169-C. (German.) Investigation of the Crystal Structure of Pure Aluminum and Raffinal Pressure Cast Ingots. Dietrich Altenpohl. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 535-544.

Advantages and disadvantages of pressure cast structure in comparison with the chill cast ingot; influence of cooling rate and segregation on the corrosion resistance and blow-hole formation. Tables, graphs, micrographs, photographs. 32 ref. (C5, M26, Al)

170-C. (Italian.) A New Method for Extracting Silver From Pb-Zn-Ag Alloys by the Parker Process. E. Freni. *Metallurgia italiana,* v. 47, no. 7, July 1955, p. 315-321.

In this method, zinc is eliminated by fusion with sodium hydroxide; silver-rich lead anodes form silver slurry in sulfamic electrolyte. Further processing described. Tables, graphs, diagrams, phase diagram. 6 ref. (C23, C28, Ag)

171-C. (Italian.) Zinc and Copper Cathodes Cast in Large Electric Furnaces. J. Tostmann and G. Conti. *Metallurgia italiana,* v. 47, no. 7 July 1955, p. 322-330.

Contemporary types of furnaces for copper and zinc smelting. Graphs. diagrams, photographs. (C21, Cu, Zn)

172-C. (Russian.) Mineral Formation Processes During the Service Life of Dinas Brick in the Crown of an Electric Lead Smelting Furnace. N. I. Kulaeva. *Ogneupory,* v. 20, no. 5, 1955, p. 228-233.

Chemical compositions and spectrochemical analysis in different zones of the brick after service; vitrification and loss in surface layer. Tables, photograph micrographs. 4 ref. (C21, Pb)

173-C. The Influence of Vibration on the Solidification of an Aluminum Alloy. R. S. Richards and W. Rostoker. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 23, 1955, 21 p.

Vibration imposed during solidification of an aluminum alloy produces grain refinement, pipe suppression, suppression of columnar grain growth and elimination of dendritic grain geometries. Diagrams, graphs, micrographs. 4 ref. (C5, N12, Al)

174-C. Gases in Copper, as Exemplified by Porosity in Deoxidised Billets. Clement Blazey. *Australasian Engineer,* 1955, Aug., p. 71-75.

Causes discussed. Comments on failure of some holes to weld in hot working. Twelve varieties (seven cast in Australia and five in North America) of 3-in. billets considered. Table, micrographs. 12 ref. (C5, Cu)

175-C. How Mitsubishi's New Akita Plant Makes 99.997% Electrolytic Zinc. Katsuji Nakanishi. *Mining World,* v. 17, Oct. 1955, p. 56-59, 70.

Operations at plant based on four kinds of concentrates. Photographs, tables, flowsheet. (C23, Zn, Cd)

176-C. (German.) **Investigation of Johnson Process for Aluminum Production.** H. Ginsberg and G. Wilde. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 9, Sept. 1955, p. 403-413.

Johnson method of aluminum production, its theoretical basis, laboratory experiments and pilot plant tests. Tables, micrographs, graphs, diagram. (C general, Al)

177-C. (Book-German.) **Electrolytic Precipitation and Electrocrystallization of Metals. Elektrolytische Abscheidung und Elektrokristallisation von Metallen.** Hellmuth Fischer. 717 p. 1954. Springer-Verlag, Berlin, Germany.

Electrochemistry, electrocrystallization, properties of cathode precipitation, and conditions for the precipitation of several metals and alloys. (C23)

D

Ferrous Reduction and Refining

323-D. Charging Open Hearth Furnaces. R. Solt. *British Steelmaker,* v. 21, Sept. 1955, p. 294-297.

Constant flow of charge materials depends on capacity of supply system and handling plant. Diagrams, graphs. (D2)

324-D. Capacity Gains, Fuel Savings Push All-Basic Openhearth. *Iron Age,* v. 176, Sept. 22, 1955, p. 114-115.

Two steel producers will begin using all-basic openhearth furnaces early next year; 20% gains in steelmaking capacity, and 5% savings in fuel consumption reported. Photograph.(D2, ST)

325-D. Oxidation of Titanium From Liquid Steel Into Slag in Acid and Basic High-Frequency Furnaces Under Various Slags. P. Bardenheuer and W. A. Fischer. *Henry Brutcher Translation No.* 3462, 22 p. (From *Archiv für das Eisenhüttenwesen,* v. 25, nos. 11-12, 1954, p. 515-521.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 76-D, 1955. (D6, AY)

326-D. Reduction of Oxides of Iron With Graphite. V. I. Arkharov, V. N. Bogoslovskii, M. G. Zhuravleva and G. I. Chufarov. *Henry Brutcher Translation No.* 3570, 12 p. (Condensed from *Zhurnal Fizicheskoi Khimii,* v. 29, no. 2, 1955, p. 272-279). Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 195-D, 1955. (D8)

327-D. (Russian.) **Higher Heat of Low-Bessemer Steel.** P. Ia. Sorokin. *Liteino proizvodstvo,* 1955, no. 8, Aug., p. 23-25.

Chemical processes of the oxidizing blast in the converters and the role of slag-forming impurities; composition of the gases at various stages of the process; explanation for the use of a higher temperature than that required for the usual Bessemer steel. Tables, graph. 10 ref. (D3, ST)

328-D. (Russian.) **Tests of Refractories for the Checkered Brickwork of the Regenerators in Open-Hearth Furnaces.** E. A. Kogon. *Ogneupory,* v. 20, no. 5, 1955, p. 210-217.

Temperatures in furnace crown, at jets, and of exhaust gases, factors affecting brick life, use of chromium-magnesite brick, Dinas brick and other refractories, chemical compositions before and after service, breakdown rates compared. Tables, photographs. (D2)

329-D. (Russian.) **Behavior of Sulfur in Blast Furnace Melting and Methods of Lowering the Sulfur Content in Cast Iron.** V. G. Voskoboinikov *Stal',* v. 15, no. 7, July 1955, p. 583-591.

Determination of sulfur content in cast iron; losses through the furnace mouth and by other means; absorption of sulfur by lime, iron, and slags; desulfurizing cast irons by magnesium and by soda. Diagrams, graphs, table. 22 ref. (D1, Fe)

330-D. (Russian.) **Effect of the Crystallization Conditions of Steel on the Rejection of Ingots Due to Cracks.** V. A. Efimov, V. I. Danilin and M. P. Lapshova. *Stal',* v. 15, no. 7, July 1955, p. 601-606.

Cause of hot transverse cracks is the retardation of ingot shrinkage in the mold; shrinkage mechanics of various steels and space between ingot and different parts of the mold during solidification; effect of design and condition of molds. Diagrams, graphs, table. 7 ref. (D9, ST)

331-D. (Russian.) **Bottom Casting Without Pressure With a Pause During the Filling of the Hot-Top.** N. I. Shutkin. *Stal',* v. 15, no. 7, July 1955, p. 607-611.

New procedure for bottom casting of 500 kg. steel ingots; timing of hot-top filling decreases porosity, nonmetallic inclusions and inspection effort. Photographs, tables, diagrams. (D9, ST)

332-D. (Russian.) **Mixing of Metal and Slag in Open-Hearth Furnaces.** A. I. Osipov, L. A. Shvartsman, M. T. Bul'skii and A. G. Alimov. *Stal',* v. 15, no. 8, Aug. 1955, p. 709-713.

Use of radioactive indicators for studying processes in the bath of steelmaking furnaces to determine movement of liquid in relation to technological factors. Diagrams, tables, graphs. 4 ref. (D2, ST)

333-D. (Russian.) **Increasing the Stability of High-Percentage Ferrosilicon.** T. P. Khazanova and Iu. P. Vasin. *Stal',* v. 15, no. 8, Aug. 1955, p. 720-727.

To obtain a high-percentage ferrosilicon, pure charge materials must be used. For good stability, the rate of cooling is increased by teeming into molds for making ingots no thicker than 70 to 100 mm. Microstructure and effect of impurities discussed. Micrographs, graphs, tables, diagram. 6 ref. (D9, M27, Fe)

334-D. Pneumatic Steelmaking Processes. III. D. J. Carney. *Blast Furnace and Steel Plant,* v. 43, Sept. 1955, p. 1006-1010.

Major metallurgical and engineering factors in connection with side blowing. Additional heat is available from oxidation of carbon, making heat requirements from oxidation of silicon and phoshorus less critical. Low-nitrogen steels can be produced, thus improving ductility of steel, sulfur removal is more effective, low blast pressures allow lower-cost blowing equipment. Tables. 12 ref. (D3, ST)

335-D. Continuous Casting Installation for Stainless and Alloy Steels. *Engineer,* v. 200, Sept. 9, 1955, p. 383-384.

Experience with continuous casting process, automatic scarfing machine used on stainless steels, Sendzimir hot planetary mill and electrolytic salt descaling process used in annealing and pickling. Graph, diagrams. (D9, F21, F23, L12, SS, ST)

336-D. Steelmaking at Redbourn. S. R. Isaac. *Iron and Steel Institute, Journal,* v. 181, Sept. 1955, p. 44-49.

Survey of layout, equipment and operation of present melting shop with reference to all-basic openhearth furnace and new desiliconizing plant. Tables. (D2, A5, ST)

337-D. Steel Manufacture. Walter Mathesius. *Metal Progress,* v. 68, Sept. 1955, p. 77-81.

Review of three major steel-producing methods, with a look into a future when a widely decentralized steel industry may refine metal by the newer pneumatic processes and cast it continuously into extrusion billets or slabs for single mill stands. Photographs. (D general, ST)

338-D. Desiliconizing in Basic Openhearth Furnaces. (Digest of "Desiliconized Hot Metal in Basic Openhearth Furnace", by L. M. Billimoria, T. V. S. Ratnam and S. N. Anant Narayan; *Technical Journal* of the Tata Iron and Steel Co., v. 2, Jan. 1955.) *Metal Progress,* v. 68, Sept. 1955, p. 173 + 4 pages.

Desiliconization of blast furnace hot metal carried out and controlled in a stationary basic openhearth furnace with help of oxygen. Success of experiments is due to the normal bath depth of about 30 in. of the furnace used for desiliconization. (D2)

339-D. Results of One Year's Researches on the Low-Shaft Furnace. II. *Henry Brutcher Translation No.* 3562, 17 p. (From *Revue universelle des Mines,* v. 11, ser. 9, no. 2, 1955, p. 58-65.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 163-D, 1955, (D8, D1)

340-D. (Czech.) **Experience in the Production of Heavy Ingots.** Oldrich Bohus. *Hutnické listy,* v. 10, no. 8, Aug. 1955, p. 456-461.

Regulation of casting schedules for large ingots (100 to 130 tons) shows an optimum procedure which yields improved steel. Graph, diagrams, tables, photographs. (D9, ST)

341-D. (French.) **Technical Development and Progress in the Conception and Construction of Cowpers.** Schoendoerffer. *Centre de Documentation Sidérurgique, Circulaire d'Informa-*

tion Techniques, v. 12, no. 9, 1955, p. 1753-1771.

Critical examination of improvements in the construction and operation of Cowpers made in recent years from practical, theoretical and heating points of view. Diagrams, photographs, graphs. 6 ref. (D1)

342-D. (French.) **Application of the Prerefining of Basic Bessemer Pig Iron.** Bauer. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 9, 1955, p. 1773-1785.

Results obtained in industrial prerefining of low-sulfur basic bessemer pig using a pure-oxygen blast. Comparison of prerefined and nonprerefined pigs. Photographs, graphs, tables. (D3)

343-D. (French.) **Use of Histograms for the Study of the Behavior of Converter Bottoms.** Delong. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques,* v. 12, no. 9, 1955, p. 1787-1799.

Histographic study of life of converter bottoms, methods of production and variations between factories at 18 French steel mills over a 12-month period. Histograms, tables. (D3, ST)

344-D. (German.) **Noise Measurement as Control and Observation Means in Air Blowing Purification Progress.** J. Klärding. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 780-783.

Experience in control of air blowing in steel manufacturing by noise measurement and its relation to different stages of the process. Graphs, tables, curves. 3 ref. (D3, ST)

345-D. (German.) **The Arrangement of an Air-Cooling System in the Hearth Block of Furnaces.** Joachim Tischendorf. *Metallurgie,* v. 5, no. 4, Apr. 1955, p. 132-134.

Lowers temperature in concrete and removes temperature differences where carbon stones are used for setting on furnace foundations. Graphs. diagrams. (D1)

346-D. (German.) **Popular Exposition of Metallurgical Processes in the Basic Open-Hearth Process.** Stefan Kronmarck. *Metallurgie,* v. 5, no. 8, Aug. 1955, p. 250-252.

Purpose is to promote knowledge of melters and foremen. Diagram, graphs. (D2)

E
Foundry

382-E. It Is Not All Sand! C. A. Sanders and Nathan Levinsohn. *American Foundrymen's Society, Preprint No.* 55-101, 1955, 5 p. (TS200 Am 35t)

Pictorial article defends sand, and accuses "human variable" for casting defects. Photographs. (E11)

383-E. An Example of Work Simplification in Fettling Operations. F. C. Pearce. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Aug. 1955, p. 16-18 + 4 plates; disc., p. 18-19.

Economies result from removing fettling operation and collecting scrap during machining. Photographs, graph, diagram. (E general, G17, A5, CI)

384-E. The Expansion of Moulding Sand With Increase of Temperature. R. G. Godding. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Aug. 1955, p. 23-29.

Effect of moisture content, degree of ramming and various additions on the expansion of natural and synthetic molding sand with increase in temperature. Graphs. 3 ref. (E18, CI)

385-E. High Temperature Properties of Sands Containing Coal Dust and Woodflour. R. G. Godding. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Aug. 1955, p. 30-35.

Relationship between strength and temperature of a synthetic sand shown with two rates of heating. Graphs. 7 ref. (E18, CI)

386-E. Re-Lining Shaft Bearings With Anti-Friction Alloys. W. M. Halliday. *Canadian Metals,* v. 18, Sept. 1955, p. 37-38.

Care must be taken to use appropriate equipment and proper methods of pouring to avoid extra cost and serious accidents. (E23, SG-c)

387-E. Foundry Practice. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News,* v. 34, Sept. 1955, p. 207-208.

Continues discussion of molten metal and begins section on fettling operations. (To be continued.) (E23)

388-E. Metal Oxide Sealer Effectively Impregnates Castings. W. J. Grassby. *Iron Age,* v. 176, Sept. 15, 1955, p. 135-137.

A fast-acting sealer teamed with high-speed wash-drier unit enables aluminum die castings to be impregnated at rates up to 600 per hr. and to withstand pressure to 2100 psi. without leakage. Photographs. (E13, Al)

389-E. Hot Blast Cupolas. A Review of Types at Present Operating in Great Britian. G. J. Shaw. *Iron & Steel,* v. 28, Sept. 1955, p. 415-420.

Advantages obtained by operating hot blast cupolas. Various types of hot blast systems in use in United Kingdom. Details of their operating techniques and performance. Diagrams. 8 ref. (E10)

390-E. The Shaw Process of Precision Casting. *Machinery (London),* v. 87, Sept. 2, 1955, p. 577-584.

Developments and applications of process which rivals "lost wax" and die cast procedures. Photographs. (E15)

391-E. Handling Methods in Non-Ferrous Foundries—First Principles. Frank Hudson. *Metal Industry,* v. 87, Sept. 2, 1955, p. 185-190.

Suggests ways of increasing efficiency by avoiding direct handling in various foundry duties. Capital equipment changes suggested. Photographs, diagrams, table. 11 ref. (E11, A5)

392-E. Casting of Steel Shot. F. T. Efimov, F. I. Mikhalev, and P. G. Karpov. *Henry Brutcher Translation No.* 3452, 9 p. (Abridged from *Liteinoe Proizvodstvo,* v. 5, no. 6, 1954, p.1-3.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 662-E, 1954. (E general, CI)

393-E. Carbon Dioxide Hardening Process for Coremaking With a Core-blowing Machine. W. Jansen. *Henry Brutcher Translation No.* 3456, 4 p. (From *Giesserei,* v. 42, no. 9, 1955, p. 236-237.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 255-E, 1955. (E21)

394-E. (German.) **The Progress in the Production and Application of High Alloy Cast Steel in the Chemical Industry.** F. Pölzguter. *Werkstoffe und Korrosion,* v. 6, nos. 8-9, Aug.-Sept. 1955, p. 375-385.

Analyses of various alloy steels and high alloyed materials of the Stellite and Hastelloy groups and titanium. Description of the techniques of various casting processes, including normal, centrifugal, Croning and precision casting methods. Tables, graphs, photographs, diagrams. (E general, T29, AY, Co, Ni, SG-g, h)

395-E. (Polish.) **Casting of Metals.** Stanislaw Ruranski. *Wiadomosci hutnicze,* v. 11, nos. 7-8, July-Aug. 1955, p. 241-248.

Sand, continuous, vacuum, precision, die and other types of casting. Photographs. (E general)

396-E. (Russian.) **Manner of Operation in Mechanical Inertia Shakeout Screens and Vibration Screens.** P. N. Aksenov. *Liteinoe proizvodstvo,* 1955, no. 8, Aug., p. 16-19.

Equations covering damping, proportional speeds, forced vibrations and other factors in the operation. Graphs, table. 7 ref. (E24)

397-E. (Russian.) **Mechanism of the Formation of Gas Pores in Castings.** L. S. Sapiro. *Liteinoe proizvodstvo,* 1955, no. 8, Aug., p. 21-22.

Types of gaseous inclusions; conditions for their appearance; measures for avoiding them. Micrographs, diagram. 4 ref. (E25, CI, Ni, Cu)

398-E. Gas in Light Alloys. N. J. McGaw. *Australasian Engineer,* 1955, July, p. 46-49, 88.

Occurrence, effect and removal of gas, the presence of which is due essentially to moisture that has numerous sources in connection with melting and casting. Possibilities of removing gas from the liquid metal. Graphs, radiographs, micrographs. 7 ref. (E25, EG-a)

399-E. Shell Molding at Lynchburg. Robert H. Herrmann. *Foundry,* v. 83, Oct. 1955, p. 102-115.

One of first foundries designed, built and operated solely to produce shell mold castings. Makes gray and ductile iron parts. Photographs, diagram. (E16, A5, CI)

400-E. Castability of Aluminum Alloys. M. M. Karnowsky. *Foundry,* v. 83, Oct. 1955, p. 116-118.

Results of studies to determine castability of the alloys and factors which affect this property. Spiral test castings used to measure running qualities. Graphs, photographs, tables. (E25, Al)

401-E. Melting Furnaces in the Brass Foundry. Harry St. John. *Foundry,* v. 83, Oct. 1955, p. 119-125.

Suggests considering quality of metal, working conditions, operation, investment and maintenance cost, flexibility and convenience, maintenance and operating skill. Photographs, diagrams. (E10, Cu)

402-E. Use of Zircon Sand in Producing Large Castings. Hubert Chappie. *Foundry,* v. 83, Oct. 1955, p. 126-131.

Reduces metal penetration of sand. Graph, table, photographs. (E18, ST, Zr)

403-E. Close Control Pays Off in Aluminum Foundry Operations. Edwin Bremer. *Foundry,* v. 83, Oct. 1955, p. 135-139.

Careful control of all operations during production of the alloy castings has paid big dividends to small foundry. Photographs, flowsheet. (E general, Al)

404-E. Spalling of Green-Sand Moulds and Its Relation to Casting Defects. H. Pettersson. *Foundry Trade Journal,* v. 99, Sept. 8, 1955, p. 263-271; v. 99, Sept. 15, p. 301-308; disc., p. 308-309.

Study of resistance to sudden heat of molten metal, composition of sand and mold hardness. Considers influence of gas pressure and thermal expansion of sand, rate of heating; grain size and distribution of sand; quality and quantity of binder; moisture content; additions of coal dust, cereals, and sugar; storage of molds; ramming density or mold hardness; and relation between spalling resistance and test values obtained by normal sand testing. Graph, diagrams, table. 10 ref. (E18, E19)

405-E. Effect of Mould Material on the Solidification Rate of Cast Metals. *Foundry Trade Journal,* v. 99, Sept. 15, 1955, p. 291-298; v.99, Sept. 22, 1955, p. 331-339.

The coarser the sand, the harder a mold is rammed, the higher the moisture content of a sand, the greater the cooling power. Coal dust causes some increase in cooling power of mold in casting sections up to 1½-in. thick. Diagrams, micrographs, photograph, tables, graphs. 8 ref. (E25, E18, CI)

406-E. What the Future Holds for the Foundry Industry. George W. Cannon. *Metal Progress,* v. 68, Sept. 1955, p. 133-136.

Past progress and future trends. Progress in the foundry industry will be most stimulated by sound, scientific management and by the establishment of good apprentice training programs. Photograph. (E general)

407-E. Pros and Cons of Shell Molding Process. (Digest of "What Does Shell Molding Offer the Producer and User of Castings?" by W. H. Dunn; presented at Western Metal Congress, Mar. 28, 1955.) *Metal Progress,* v. 68, Sept. 1955, p.214, 216, 218.

Review of methods and equipment. (E16)

408-E. How We Solved Our Hot Cracks Problems. F. W. Jacobs. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 30-36.

Defects apparently were caused by pouring too refined a metal into sand which was too insulating. Melting operations and metal composition described. Tables, photographs, graph. (E25, CI)

409-E. Practical Tips on Shell Molding. G. P. Derby. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 42-47.

Problems of making and assembling shell molds. Photographs. (E16)

410-E. 59 Answers to Your Shell Molding Problems. Jack E. Bolt. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 48-51.

Review of shell defects and preventive measures. Diagram, photographs. 4 ref. (E16)

411-E. What's the Feeding Range in Shell Molds? W. S. Pellini, H. F. Bishop and R. E. Morey. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 52-56.

Feeding characteristics of risers. Photographs, graphs, table radiographs. 14 ref. (E16, E22)

412-E. Chain Casting Secrets. Bill Walkins. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 58-59.

Methods and equipment for casting interlocking steel chain links. Photographs. (E general, CI)

413-E. One Iron in the Cupola—Many in the Ladle. Grant E. Spangler and R. Schneidewind. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 60-64.

Carbon can be introduced in molten cast irons in a ladle or a forehearth by the injection process. Increases of up to 1% carbon were made consistently in 3 min. or less. Tables, graphs, micrographs. 7 ref. (E23, E25)

414-E. No Need for Rat-Tails. Harry W. Dietert. *Modern Castings and American Foundryman,* v. 28, Oct. 1955, p. 65-68.

Sand selection, proper mixtures and controlled ramming help eliminate this casting defect. Photographs, micrographs, graph. (E11, CI)

415-E. What Alloy for Investment Casting? William W. Lamb. *Steel,* v. 137, Oct. 3, 1955, p. 72-73.

Representative alloys and their properties given in table form to provide immediate selection of the proper metal. Photographs, table. (E15, Cu, Be)

416-E. Hydrodynamic Theory of Horizontal Centrifugal Casting. B. F. Vilyum. *Henry Brutcher Translation No.* 3566, 11 p. (From *Izvestiya Akademii Nauk SSSR, OTN,* 1954, no. 10, Oct., p. 39-46.) Henry Brutcher, Altadena, Calif.

Study of motion of a heavy viscous liquid rotating around a horizontal axis of symmetry. Development of equations for the distribution of a liquid around the internal periphery of a hollow tube rotating about its center of symmetry where the thickness of the liquid layer is a small fraction of the tube's internal radius. Table, diagrams, 2 ref. (E14)

417-E. (Czech.) **Pouring of Heavy Traverses for Machine Tools.** Svatopluk Jouza. *Slévarenstvi,* v. 3, no. 8, Aug. 1955, p. 233-236.

Use of a combined gating system, partly from side bottom runner and partly by using the shower system, was required for flowing and directional solidification to produce sound castings. Diagrams. (E22, E25)

418-E. (Czech.) **Exothermic Sleeves for Risers.** Lev Petrzela. *Slévarenstvi,* v. 3, no. 8; *Prace Ceskoslovenského vyzkumu slévarenského,* v. 2, no. 21, Aug. 1955, p. 145-148.

Because of their control, best results are obtained with mixtures with aluminothermic reactions. Photographs, graphs, table. 23 ref. (E22, CI, ST)

419-E. (Czech.) **Use of Oxygen in the Cupola.** Zdenek Hostinsky and Cestmir Hlousek. *Slévarenstvi,* v. 3, no. 8, *Prace Ceskoslovenského vyzkumu slévarenského,* v. 2, no. 22, Aug. 1955, p. 149-156.

Oxygen enrichment studied in the laboratory and foundry. A 1% oxygen increase raised cupola temperature 13° C. and output 6.7%. Cost of oxygen limits its application. Tables, diagram, photograph, graphs. (E10, CI)

420-E. (French.) **Feed Heading of Steel Moldings. Development; Study; Preparation; Examples of Applications.** Maurice Josset. *Fonderie,* 1955, no. 115, Aug., p. 4641-4650.

Gravity and atmospheric feed heads, centrifugal pressure casting, applications to high-pressure pump parts and a helical shaft support. Diagrams. (E22, ST)

421-E. (French.) **Comparison of the Costs of Industrial Operation of Water-Cooled Cupolas and Cupolas With Normal Acid Lining.** Francois Danis and Pierre Détrez. *Fonderie,* 1955, no. 115, Aug., p. 4651-4658.

Comparative study of operating costs in 1953 and 1954 of above cupolas of approximately the same size and production. Tables, diagrams. (E10, CI)

422-E. (German.) **Introduction of Core-Molding Method in the Reorganization of a Large Casting Foundry.** Fulvio Forti. *Giesserei,* v. 42, no. 18, Sept. 1, 1955, p. 457-462.

Nature of the method, operating instructions when applied to the large castings, advantages and disadvantages of the process. Graphs, photographs, diagrams, tables. 1 ref. (E21)

423-E. (German.) **Advances Made in the Production and Application of Centrifugal Castings of Steel.** Franz Pölzguter. *Giesserei,* v. 42, no. 19, Sept. 15, 1955, p. 493-500.

Principles of various processes, history and present status of patent rights, production of tubes in horizontal and vertical machines; applications. Photographs, diagrams, tables, graphs. 11 ref. (E14, CI)

424-E. (German.) **The History of the Norwegian Foundry Industry.** Torolf Krogvig. *Giesserei,* v. 42, no. 19, Sept. 15, 1955, p. 524-526.

Describes charcoal blast furnaces, cast iron ware, introduction of cupolas and the Hiorth and Tysland furnaces. Photographs, diagrams. 4 ref. (E10, D1, CI)

F

Primary Mechanical Working

218-F. Forging Techniques. James A. Horn. *Aero Digest,* v. 71, Sept. 1955, p. 36-38, 40, 42.

Aircraft designer can concern himself with design efficiency, now that modern forging produces a finished pressing requiring minimum machining. Diagrams, table, photographs. (F22)

219-F. Induction Heating of Ingot Steel. *Canadian Metals,* v. 18, Sept. 1955, p. 32-34.

New dual-frequency, twin-tube furnace shows saving over all conventional heating methods. Photographs, diagram. (F21, J2, ST)

220-F. Status of Beryllium Technology in the U. S. A. A. R. Kaufmann and B. R. F. Kjellgren. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.-8/P/820, June 1955, 21 p.

Uniform rods and flats now produced have large ductility in extrusion direction but only 1 to 2% in the transverse direction; cross rolling develops greater ductility in all directions of sheet plane but does not reduce brittleness perpendicular to plane. Preparation and properties of beryllium oxide discussed. Table. 20 ref. (F23, F24, Q23, Be)

221-F. How to Get Good Results in Forging High-Temperature Alloys. A. A. Scafati. *Iron Age,* v. 176, Sept. 8, 1955, p. 67-70 .

Methods of attaining the results by using correct temperature control, proper reduction rates, methods. Photographs, table. (F22, SG-h)

222-F. Bearings, Lubricants, and Lubrication. *Mechanical Engineering,* v. 77, Sept. p. 789-801.

Digest of 1954 literature reviews bearing lubrication, automotive, gear,

and metalworking lubricants, lubricant theory and properties. 230 ref. (F1, G21)

223-F. The Production of Large Forgings in Aluminum Alloys. C. Smith and J. Crowther. *Royal Aeronautical Society, Journal,* v. 59, Sept. 1955, p. 604-612.

Needs for forgings of large size are increasing, but the consideration of alloy selection, forging stock and methods, desirable properties, heat treatment and corrosion resistance present serious problems. Photographs, table, diagrams, graphs. (F22, Al)

224-F. The Rolling of Metals and Alloys. VI. A Study of the Influence of Coiler and Decoiler Tension on the Magnitude of the Rolling Load. E. C. Larke. *Sheet Metal Industries,* v. 32, no. 341, Sept. 1955, p. 699-704.

Devices for applying and controlling tension; optimum adjustments. Graphs, diagrams, tables. (To be continued.) (F23)

225-F. Avoiding Titanium's Allergy to Air. G. J. Wile. *Steel,* v. 137, Sept. 19, 1955, p. 112-113.

To prevent interstitial contamination by heating in air, safe time-temperature combinations for forging and hot forming were sought. Tables, nomographs, graph. (F22, Ti)

226-F. Boundary-Friction Lubricants [Chiefly for the Cold Working of Metals]. M. Kühn. *Henry Brutcher Translation No.* 3551, 12 p. (Condensed from *Stahl und Eisen,* v. 72, no. 20, 1952, p. 1212-1216.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 321-F, 1952. (F1)

227-F. Remote Slitting Machine. L. N. Howell and C. C. Webster. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 236-242.

Capable of cutting metal samples of various cross sectional configurations up to ¾ in. across in longitudinal direction, while submerged in organic liquid. Photographs. (F29)

228-F. (Czech.) **The Forging of Cog Wheels With Preformed Teeth.** J. David and A. Huska. *Strojirenstvi,* v. 5, no. 6, June 1955, p. 433-436.

Method economizes through minimum subsequent machining of teeth and in material savings. Procedure given for making die inserts and techniques for producing different types of cog wheels. Photographs, diagrams. (F22, G1, G3, G17, ST)

229-F. (German.) **Cold Rolling of Phosphate Coated Steel Strips.** Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen,* v. 75, no. 17, Aug. 25, 1955, p. 1085-1092.

Development of the phosphate coating methods; effect of phosphate coats on the strength of rolled strips, on the force and work done in rolling thin strips in a 12-roll rolling mill, and of surface pressure on efficiency of the coats. Table, graphs, micrographs, diagrams. 37 ref. (F23, F1, ST)

230-F. (Hungarian.) **The Calculation of Cylinder Pressure During Pilger Rolling.** Rezso Hantos. *Kohaszati lapok,* v. 10, no. 8, Aug. 1955, p. 345-365.

Details of method, based on the Geleji formula. Diagrams, graphs. (F23)

231-F. (Polish.) **The Role of Initial Coarse Rolling in the Development of Defective Rolled Products.** Zbigniew Sobczyk. *Wiadomosci hutnicze,* v. 11, no. 5, May 1955, p. 134-137.

Types of defective rolling mill products traceable to the first rough rolling. Effects of overheating, or underheating, twisting, and over-rolling or unequal rolling. Graphs. (F23, ST)

232-F. (Polish.) **Working the Metal From the Rear Side of the Rolling Installation.** Edward Decowski. *Wiadomosci hutnicze,* v. 11, nos. 7-8, July-Aug. 1955, p. 211-214.

Experiments in applying rolling force from both sides, (i.e., alternately from the rear and the front, in the rolling of structural H-bars), show a reduction in the number of passes and an improvement in the quality of the rolled metal. Diagrams, tables. (F23)

233-F. (Russian.) **Calculation of the Cooling of Metal During Hot Rolling.** A. G. Stukach. *Stal',* v. 15, no. 7, July 1955, p. 626-629.

Equations for calculating temperature of the metal, in terms of the separate hot rolling passes, taking into account heat losses by zone due to radiation and other factors; comparison with direct measurement. Graphs. 8 ref. (F23)

234-F. Two Decades of Progress in the Forging Industry. H. J. Merchant. *Australasian Engineer,* 1955, July, p. 56-68.

Economic and competitive position of the industry, equipment, new materials, technique and improved working conditions. Photographs, diagrams. 27 ref. (F22, A4)

235-F. Estimation of Temper-Rolling Reductions of Mild-Steel Sheet by an X-Ray Diffraction Method. P. W. Wright and B. B. Hundy. *Iron and Steel Institute, Journal,* v. 181, Sept. 1955, p. 40-43 + 4 plates.

By comparing pattern from unknown sample with those from standard samples, it is possible to estimate temper-rolling reduction of unknown. Diagram, photographs, micrographs. 5 ref. (F23, M22, CN)

236-F. The Design of Closed-Die Forgings. *Metal Progress,* v. 68, Aug. 15, 1955, p. 65-75.

Details of hammer forgings. General forging considerations such as tolerances, costs, steel selection and design. Diagrams, graphs, tables. (F22)

237-F. The Forging and Heat Treating of Tool Steel. *Metal Progress,* v. 68, Aug. 15, 1955, p. 151-157.

Step-by-step procedure for recommended processing of toolsteels. Tables, photographs. (F22, J general, TS)

238-F. The Precision Forge—Roll Process. A. E. Felt. *Steel Processing,* v. 41, Sept. 1955, p. 571-574, 602.

Combination of forging and rolling used to produce steel components for hollow propeller blades. Photographs, diagrams. (F22, F23, ST)

239-F. Impacter Applied in New Production Process. T. A. Dickinson. *Steel Processing,* v. 41, Sept. 1955, p. 575, 603.

Currently being used in manufacture of aluminum rocket fin blades for U. S. Navy, this cold forging could serve many other applications where use of raw materials of high ductility is practical. Photograph. (F22, Al)

240-F. Flame-Straightening: A Friend in Need. I. Joseph Holt. *Welding Engineer,* v. 40, Oct. 1955, p. 44-46.

Oxy-acetylene torch can be used to salvage bent steel members or to bend members for fabrication. Photographs, diagrams. (To be continued.) (F29, G6, ST)

241-F. (French.) **Structure and Properties of Restored Metal.** Aurel Berghezan. *Métaux corrosion-industries,* v. 30, nos. 359-360, July-Aug. 1955, p. 269-293 + 4 plates.

Phenomena observed during cold working and annealing of an aluminum-magnesium alloy with 3.05% magnesium. Color micrographic and X-ray study. Micrographs, graphs, charts, drawings, table. 29 ref. (F23, J23, Al)

242-F. (German.) **Investigation of Belt Drop-Hammer With Divided Hammer Tup.** Paul Grüner and Edmund Kraft. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 507-518.

Investigation of falling tups and factors of drop height, distance between the tups, hammer weight, anvil movement, forging losses and stand vibration. Graphs, photographs, diagrams, oscillogram. 14 ref. (F22)

243-F. (German.) **Contribution to Light Metal Semi-Finished Surface Conditions Before the Anodic Oxidation Process.** H. A. J. Stelljes. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 748-751.

Methods of improvement of semi-finished decorative metal surfaces before anodizing by pressing, rolling, grain improvement and annealing of aluminum. Micrographs, graph, 7 ref. (F23, J23, Al)

244-F. (German.) **Shaping of Polycrystalline Magnesium.** F. Erdmann-Jesnitzer and H. Kahle. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 776-779.

Workability and peculiarities of magnesium, data on optimal conditions and upsetting factor. Diagram, graphs, tables, micrographs. 6 ref. (F22, Q23, Mg)

245-F. (German.) **Forging.** Eberhard Pflaume. *Metallurgie,* v. 5, no. 8, Aug. 1955, p. 245-250.

When to use hammer or press. Photographs. 56 ref. (F22)

246-F. (German.) **Machines for Processing Medium and Heavy Plates.** Friedrich Wilhelm Zürcher. *Stahl und Eisen,* v. 75, no. 18, Sept. 8, 1955, p. 1182-1188.

Shears, straightening machines, bending machines and presses under working conditions at plate producer and consumer plants. Photographs. 6 ref. (F29, G1, ST)

247-F. (Pamphlet.) **Extrusion of Titanium. Technical Report Under Contract no. AF 33(038)-3736.** Alvin M. Sabroff, W. Maxwell Parris, and Paul D. Frost. PB 111696. 77 p. 1955. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Unalloyed titanium and the Ti-3Mn-complex alloy were used to study effects of extrusion temperature and die design and to evaluate various lubricants and die materials. Lubricants containing graphite, molybdenum disulfide, and mica produced acceptable surface finishes; however, the best results were obtained with these materials suspended in a Bentone grease. The titanium and chromium carbides, and cobalt-base alloys were the most promising die materials. Photographs, graphs, tables, diagram. (F24, Ti, Co)

G

Secondary Mechanical Working

265-G. Machining Aluminum Honeycomb Without Aid of Filler Materials. G. R. Gordon. *Automotive In-*

dustries, v. 113, Sept. 15, 1955, p. 55, 138.

Opens new field for use of honeycomb core fillers in manufacture of aircraft components. Photograph, diagram. (G17, Al)

266-G. The Grinding of Steel. XXV. Grinding and Finishing Machines. *Edgar Allen News*, v. 34, Sept. 1955, p. 203-204.

Operation of some grinding wheels. Photographs. (G18, ST)

267-G. The Floturning Process. *Machinery (London)*, v. 87, Sept. 2, 1955, p. 577-562.

Akin to spinning, process requires a massive lathe with a flexible angular head and a rigid driven disk as the forming tool working against a mandrel. Photographs, diagrams. (G17, ST, Al)

268-G. Automatic Control of Machine Tools. R. W. Fenemore and C. R. Borley. *Research*, v. 8, Sept. 1955, p. 351-356.

For accurate and fast machining, the question of tool cutter wear must be fully investigated and reduced to a minimum, and the table positioning servomechanism needs to be accurate. Diagrams. 5 ref. (G17)

269-G. An Investigation Into the Use of Plastic Tools for Presswork With Particular Reference to the Aircraft Industry. Paul K. Digby, Walter J. Paul and J. V. Connolly. *Sheet Metal Industries*, v. 32, no. 341, Sept. 1955, p. 645-662.

Plastics facilitate easier and cheaper tool production than is practicable with zinc and, for the tools produced, reduced the necessary time cycle by about 80% with a corresponding reduction in man-hours required. Tables, diagrams, photograph, graphs. (G1, Al)

270-G. SRL Remote Underwater Cutoff Machine. G. J. Deily. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 225-235.

For sectioning highly radio-active specimens, this machine cuts with both abrasive wheel and specimen submerged, washes down and disposes of waste by remote means, and has capacity to handle a specimen 30 in. long. Table, photographs. (G18)

271-G. (Czech.) Development of a New Type of Sintered Carbide, S4, for Machining Under Difficult Conditions. C. Agte and M. Petrdlik. *Strojirenstvi*, v. 5, no. 5, May 1955, p. 358-362.

Chemical composition of S4, properties of S group sintered carbides, compared with T and L series, experience in advantages of machining metal with S4 cutters. Tables, phase diagrams, micrograph, photograph. 26 ref. (G17, T6, C-n)

272-G. (Czech.) Czechoslovakian Electro-Erosion Machining Apparatuses. Z. Bilek. *Strojirenska vyroba*, v. 3, no. 6, June 1955, p. 247-250.

Design, performance and use in Czech and Soviet factories, advantages over "electrospark" machining. Provides easy machining process for sintered carbides and high strength steels. Photographs, tables. (G17)

273-G. (German.) Electro-Erosion Machining of Metals. Werner Ullmann. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 433-436.

Increased use of high-strength special steels and cemented metal carbides for tools calls for economical method of machining; this technique is meant to solve problem. Diagram, photographs. (G17)

274-G. (Slovak.) ESA Oxygen Electric Arc Cutting, With the Use of a Carbon Electrode. Fr. Erdmann-Jesnitzer. *Zvaranie*, v. 4, no. 5, May 1955, p. 131-135.

Advantages of East German apparatus (e.g., after cutting, the surface of the material cut remained uncarbonized). Machine used carbon arc to preheat material to be cut. Photographs, micrograph, diagram. (G22)

275-G. Temperature Distribution at the Tool-Chip Interface in Metal Cutting. B. T. Chao and K. J. Trigger. *ASME, Transactions*, v. 77, Oct. 1955, p. 1107-1119; disc., p. 1119-1121.

A rapid, iterative method for computing distribution of temperature at the tool-chip interface. Calculation shows that the maximum temperature occurs at a point near the trailing edge of the contact when chips are produced at conventional feeds and speeds with sintered carbide tools. Photograph, graphs, diagrams, tables. 27 ref. (G17)

276-G. Cutter Design and Application for Face-Milling Cast Iron and Steel. O. W. Boston and W. W. Gilbert. *ASME, Transactions*, v. 77, Oct. 1955, p. 1123-1130; disc., p. 1130-1131.

Results of tests on a variety of metals with cutters of various materials, sizes and shapes. Results, relating to cutter design, are averaged for various grades of cast iron, tool materials, feed, depth, width of bar, number of teeth in the cutter and the cutting speed. General effects of each variable obtained from final tool shapes for steel and cast iron which are given for recommended practice. Diagrams, graphs, tables. (G17, CI, ST)

277-G. Take a Card for Machine Tool Control. D. B. Schneider. *Automation*, v. 2, Oct. 1955, p. 36-39.

Business machine cards work both positioning and tool movement. Photographs. (G17, A5)

278-G. The Iron-Oxygen Combustion Process. A Study Related to Oxygen Cutting. A. A. Wells. *British Welding Journal*, v. 2, Sept. 1955, p. 392-400.

Measurements of combustion rate between iron and oxygen compared with calculations that determine rate of diffusion of oxygen to combustion face through stagnant boundary layer of gaseous impurities. Tables, diagrams, graphs. 10 ref. (G22, N1, Fe)

279-G. Electro-Machining Methods for Metals. A. L. Livshits and V. Ya. Rassokhin. *Engineers' Digest*, v. 16, Sept. 1955, p. 429-432. (Translated from *Stanki i instrument*, v. 25, no. 11, Nov. 1954, p. 12-17; v. 26, no. 1, Jan. 1955, p. 8-12.)

Review of machining by electric spark, electric impulse, anode-mechanical, electric contact and electro-mechanical methods. (G17)

280-G. Thread and Form Rolling. Clifford T. Appleton. *Mechanical Engineering*, v. 77, Oct. 1955, p. 866-871.

Process and machines for producing threads of uniform quality. Diagrams, photographs, table. (G12, G11)

281-G. Metallurgy in Mass Production. L. A. Danse. *Metal Progress*, v. 68, Sept. 1955, p. 88-92.

Comments on heat treatment and forming problems in 1918; role of the metallurgist in present day metalworking operations. Photographs. (G general, J general)

282-G. A Technique for Machining Tungsten. R. Levi. *Philips Technical Review*, v. 17, Sept. 1955, p. 97-100.

Developed for dispenser-type cathodes, this method may prove valuable for other applications. Photographs, micrograph, table. 7 ref. (G17, W)

283-G. Cold Extrusion Is Shaping Up. John E. King. *Steel*, v. 137, Oct. 3, 1955, p. 70-71.

Best applications, press life, selection of raw materials and tool engineering. Photograph, table. (G5, CN)

284-G. The Fundamentals of Progressive Tooling. II. J. A. Grainger. *Steel Processing*, v. 41, Sept. 1955, p. 579-582, 597.

Uninterrupted feeding of stock across die face is considered. Diagrams, photographs. (G1)

285-G. Heavy Surface Grinding. I. John E. Hyler. *Western Machinery and Steel World*, v. 46, Sept. 1955, p. 86-89.

Given impetus by rapid development of alloy steels. Photographs. (To be continued.) (G18, AY)

286-G. Machinability of Sintered Bronze. W. A. Irvine. *Proceedings*, Eleventh Annual Meeting of Metal Powder Association, v. I, p. 14-22; disc., p. 23-27.

Main problems at Maytag Co. were tool life and maintenance of dimensions on parts being machined. Photographs, micrographs, diagram, tables. (G17, Cu)

287-G. (Czech.) Ways of Increasing the Efficiency of Oxygen Cutting. L. Kulhanek. *Strojirenstvi*, v. 5, no. 3, Mar. 1955, p. 212-216.

New designs of cutting torches, technology of their manufacture, increasing economies in use of oxygen and acetylene. Photographs, tables, diagrams. (G22)

288-G. (Czech.) New Ideas in the Theory and Design of Milling Heads. K. Pechaty. *Strojirenstvi*, v. 5, no. 4, Apr. 1955, p. 276-281.

Factors limiting use of sintered carbides for milling, cause and prevention of self-induced vibrations, influence of cutter material on damping of vibrations. Graphs, diagrams, photographs. 4 ref. (G17)

289-G. (German.) Development and Technical Aspect of One-Purpose Machine-Tools for Iron and Steel Works. Hans G. Rohs. *Stahl und Eisen*, v. 75, no. 18, Sept. 8, 1955, p. 1162-1170.

Possibilities of increasing performance of machines used to process blooms and semifinished products such as roll turning lathes and roll grinding machines. Photographs, diagrams. 11 ref. (G17, ST)

290-G. (German.) The Machinability of Free-Cutting Steel. Herbert Müller. *Stahl und Eisen*, v. 75, no. 18, Sept. 8, 1955, p. 1171-1176.

Compilation of data taken from literature on appropriate chemical composition, melting and processing methods, heat treatment, machinability tests. Tables. 72 ref. (G17, ST)

291-G. (German.) Machining Tests With Steadily Increasing Cutting Speeds. Alexander Schepers. *Stahl und Eisen*, v. 75, no. 18, Sept. 8, 1955, 1176-1182.

Interpretation of results of short-time tests on billets made of open-hearth steels to determine effects of carbon, silicon, managanese and lead. Graphs, table. 11 ref. (G17)

H

Powder Metallurgy

167-H. Powder Metallurgy of Thorium. G. A. Meerson. *International Conference on the Peaceful Uses of Atomic Energy*, A/CONF.8/P/635,

July 1955, 12 p. (Translated from the Russian.)

Deals with calcium reduction of thoria; pressing and sintering of powder. Graphs, tables.
(H general, Th)

168-H. Brass-Powder Structural Parts in Product Engineering—An Evaluation. G. L. Werley. *Mechanical Engineering,* v. 77, Sept. 1955, p. 762-765.

Consideration for pressing and sintering, specific design and physical and mechanical properties in proposed applications. Photographs, diagram, tables.
(H general, T general, Cu)

169-H. Properties of Metal-Powder Products Obtained by Extrusion. A. S. Fialkov and Ya. S. Umanskii. *Henry Brutcher Translation No.* 3571, 8 p. (From *Doklady Akademii Nauk SSSR,* v. 96, no. 6, 1954, p. 1213-1216.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 126-H, 1954.
(H14, Q general)

170-H. (French.) **Properties of Sintered Aluminum Semi-Products.** Jean Hérenguel and Jacques Boghen. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 341-346.

Factors which effect the properties are the basic powder, conditions of sintering and deformation after sintering. Graphs, table, photograph, micrographs. 4 ref.
(H general, Q general, Al)

171-H. (French.) **Sintered Aluminum With High Heat Resistance.** Roland Irmann. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 347-357; disc., p. 357-358.

Characteristics of powders used for obtaining SAP sintered products, processing of the powder, static mechanical properties, creep strength and endurance limit under fatigue stress, oxide content and physical and chemical properties, sintered aluminum alloys. Micrographs, graphs, photographs, diagrams, table. 22 ref.
(H15, Q general, Al)

172-H. (Russian.) **Laws of Phase Transformations During the Sintering of Metal-Ceramic Copper-Lead Compositions.** T. N. Znatokova and V. I. Likhtman. *Doklady akademii nauk SSSR,* v. 103, no. 3, July 21, 1955, p. 445-447.

Copper-lead system is seen as one containing a liquid phase over a rather broad temperature range during sintering. Heat treatments and corresponding phases, microstructure and microhardness studied. Micrographs. 3 ref.
(H15, M27, Cu, Pb)

173-H. Manufacture of Metallic Powders and Pastes. G. M. Babcock and F. B. Rethwisch. *American Paint Journal,* v. 40, Oct. 17, 1955, p. 68 + 11 pages.

Stamping, ball milling, precipitation, electrodeposition, miscellaneous production methods. (H10)

174-H. Powder Metallurgy — Its Rapid Development. Henry H. Hausner. *Metal Progress,* v. 68, Sept. 1955, p. 101-105.

Unique advantages of powder metallurgy, formerly considered only for mass production of small parts, have opened a diverse and growing number of applications for the process. Diagrams, micrographs, graphs.
(H general)

175-H. Prealloyed Steel Powders and Their Applications. A. H. Grobe and G. A. Roberts. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 28-40; disc., p. 40-42

Describes rotating water jet disintegration process and reported properties of high-strength low-alloy and stainless steel powders. Diagram, tables, graphs, micrograph, photographs. (H10, H11, ST SS)

176-H. Carbide Tooling for Pressing Metal Powders. T. A. Wilson. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I., p. 44-50; disc., 50-51.

Explains ingredients and making of carbide dies; shows examples. Diagrams. (H14, SG-j, W, Ti, Ta)

177-H. The Effect of Copper Additions on Iron Powder. Some Aspects of the Sintering of Iron-Copper Mixtures. P. Ulf Gummeson and Lennart Forss. *Proceedings.* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 56-64; disc., p. 64-65.

Special consideration given to copper addition below solubility limit of copper in iron at sintering temperature. Graphs. 13 ref.
(H15, Cu, Fe)

178-H. Iron Powder Metallurgy in Europe. Present and Future. Sven I. Hulthen. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 67-101; disc., p. 101-103.

History, manufacture and use, market, raw materials, treatment of powders, pressing and tooling, sintering and a glimpse into future. Tables, photographs, graphs, micrographs, diagrams. 10 ref.
(H general, Fe)

179-H. A Powder Producer Views Titanium Powder Metallurgy. J. F. Sachse. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 104-106; disc. p. 106-107.

Advantageous properties such as weight, strength and corrosion resistance are enhanced because powder, per pound, costs much less than structural shapes per pound.
(H general, Ti)

180-H. A Fabricator Views Titanium Powder Metallurgy. H. W. Dodds. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 108-111; disc., p. 111-113.

Outlines hot pressing and press forming processes. Diagrams, photographs, table, graphs. (H14, Ti)

181-H. Method of Specifying Iron Powder Cores. Charles E. Cherry, Jr. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. II, p. 116-121.

Theory behind tools that the Association has made available to specifiers. Diagram.
(H general, Ti, Fe)

182-H. Quality of Magnetic Powder Cores for Military Applications. E. Both and D. Elders. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. II, p. 122-136; disc., p. 136.

Evaluation program developed procedures for exposing core materials to environmental stresses. Photographs, tables, graphs. 2 ref.
(H general, Ti, Fe)

183-H. The Various Iron Powders Used in Electronic Cores. J. A. Roberts and G. O. Altmann. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. II, p. 141-147; disc., p. 148-149.

History, methods of manufacture, properties and core applications. Photographs, diagram. 19 ref.
(H general, Ti, Fe)

184-H. (Czech.) **New Information About Sinterability.** Jiri Vacek. *Hutnické listy,* v. 10, no. 8, Aug. 1955, p. 469-479.

Small metallic additions to molybdenum, copper, cobalt, nickel and tungsten powders avoid thick order lattice irregularities and improve sinterability. Graphs, micrographs, tables. 15 ref.
(H15, Mi, Cu, Co, Ni, W)

185-H. (French.) **Physical Investigation Methods Used in Powder Metallurgy—Their Application to Manufacture Control.** M. R. Bernard. *Metallurgia italiana,* v. 47, no. 8, Aug. 1955, p. 367-376.

Control methods based on optical metallography, electronic microscopy, measure of specific surfaces, X-ray diffraction, magnetic measures, electron diffraction, exo-electrons, and radioactive tracers. Graphs, photographs, micrographs. 16 ref. (H11, M21, M22, M23)

186-H. (German.) **New Immersion-Impregnating Process and the Properties of Sintered Iron-Brass Compound Alloys.** E. Pelzel. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 783-790.

New method by which powder-metal specimens are immersed under vacuum, after regular sintering, into a bath of liquefied alloy which has a melting temperature lower than that of the pressed part. Parts thus produced attain a tensile strength of 60 kg. per sq.mm. and above. Graphs, diagram, table, photographs, micrographs. 14 ref.
(H16, Fe, Cu)

187-H. (Book.) **Eleventh Annual Meeting of Metal Powder Association,** *Proceedings.* v. I. General Session on Powder Metallurgy. v. 2. Electronic Core Session. 199 p. 1955. Metal Powder Assoc., 420 Lexington Ave., New York 17, N. Y.

Covers such specific metals as bronze, steel, copper, iron, titanium; and military applications in electronic equipment.
(H general, ST, Cu, Fe, Ti)

J
Heat Treatment

219-J. A Comparison of the Microstructure and Mechanical Properties of Nodular Irons Ferritized by Two-Stage and Single-Stage Annealing Treatments. G. N. J. Gilbert. *British Cast Iron Research Association. Journal of Research and Development,* v. 6, Aug. 1955, p. 11-15 + 4 plates.

Subcritical annealing of nodular cast irons gives a sub-boundary structure in the ferrite grains which may result in brittle failure, but can be avoided by annealing above 900°C. Tables, micrographs, photograph. (J23, Q26, CI)

220-J. Deep Freezing of Aluminum Castings Cuts Machining Costs. *Canadian Metals,* v. 18, Sept. 1955, p. 40, 42.

Technique fixes metal after heat treatment through relief of internal stresses. Photograph.
(J26, G17, Q25, Al)

221-J. Mechanized Heat Treatment of Grey Iron Castings. *Canadian Metals,* v. 18, Sept. 1955, p. 46-48.

Continuous, direct gas-fired furnace with cooling chamber anneals and stress-relieves medium strength castings at higher rate and with more uniform results than obtained from two car-bottom type furnaces. Photographs, diagram. (J23, J1, CI)

222-J. Pros and Cons of Carbon Restoration. P. M. Unterweiser. *Iron Age,* v. 176, Sept. 8, 1955, p. 71-73.

Reduces machining, salvage scrap, improves a borderline product. Micrographs, photographs, graph. (J26, ST)

223-J. Heat Treating Copper-Base Alloys. Arthur I. Heim. *Steel*, v. 137, Sept. 19, 1955, p. 114-117.
Various types of heat treating and different reasons for using each method. Tables, photographs. (J general, Cu)

224-J. The Optimum Boron Content for Hardenability. J. C. Shyne, E. R. Morgan and D. N. Frey. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 19, 1955, 9 p.
Relationship between boron content and hardenability established for a series of high-purity iron-carbon-boron alloys. Correlation made in terms of "effective" rather than the total boron content. Method for determining effective boron contents. Table, graphs. 7 ref. (J26, ST)

225-J. Investigation of the Heat Treatability of the 6% Aluminum—4% Va [illegible] Titanium-base Alloy. R. G. Sherman and H. D. Kessler. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 35, 1955, 19 p.
Heat treatment, stress stability, section size, elevated temperature, tensile, and fatigue studies carried out on material from production ingots. The results show that the alloy is moderately heat treatable; in ½-in. sections, tensile strengths from 130,000 to 175,000 psi. and yield strengths from 100,000 to 165,000 psi. combined with high ductilities may be obtained. Tables, graphs, micrographs. (J general, Q general, Ti)

226-J. Electric Furnace Design for Steel Heat Treatment. A. G. Wallbank. *Australasian Engineer*, 1955, Aug., p. 57-69.
Fundamental requirements and steps taken to satisfy them. Photographs. (J general, ST)

227-J. Large-Scale Continuous Annealing of Coils With Carbon Restoration. *Industrial Heating*, v. 22, Sept. 1955, p. 1770 + 8 pages.
Specialized furnace has six zones of individually controlled temperature, suction-type gas-fired radiant tubes to prevent atmosphere contamination, and recirculating fans to provide temperature uniformity and atmosphere circulation. Photographs, diagram. 4 ref. (J23, ST)

228-J. Fine Grained Phosphor Bronze. *Materials & Methods*, v. 42, Sept. 1955, p. 108-109.
Reducing grain size makes possible extra high finish, improved mechanical properties and corrosion and fatigue resistance. Photographs. (J23, M27, Cu)

229-J. Induction Hardening and Tempering. *Metal Progress*, v. 68, Aug. 15, 1955, p. 107-120.
Deals with selection and control of equipment and metal for commercial hardening and tempering by induction heating. Results of some typical production applications. Tables, graphs, diagrams, photographs. (J2, J26, J29)

230-J. Flame Hardening. *Metal Progress*, v. 68, Aug. 15, 1955, p. 124-131.
Considerations in applying process, (e.g., fuels, equipment, costs, technical details and materials to be treated). Tables, diagrams, graphs. (J2, CI, ST)

231-J. Gas Carburizing. I. Commercial Practice. II. Application of Equilibrium Data. *Metal Progress*, v. 68, Aug. 15, 1955, p. 132-143.
General description of the process; chemistry, physics and process control. Tables, graphs, digaram, photograph, micrographs. (J28, ST)

232-J. Control of Surface Carbon Content in the Heat Treatment of Steel. *Metal Progress*, v. 68, Aug. 15, 1955, p. 144-150.
Accomplished through control of the surrounding furnace atmosphere. Applications, control, and conditions for specific treatments. Graphs, tables, micrographs. (J general, TS, SS, ST)

233-J. Heat Treating Equipment and Procedures. Carl L. Ipsen. *Metal Progress*, v. 68, Sept. 1955, p. 106-109.
Past trends and future prospects. Atmosphere control, induction heating and mechanization have contributed most to improvement of heat treating processes. Future progress is limitless and impossible to predict. Photograph. (J general)

234-J. New Trend in Wire Annealing. *Steel*. v. 137, Oct. 3, 1955, p. 74-75.
Continuous pusher-type furnace turns out almost as much volume as seven bell-type furnaces, in addition to improving product uniformity. Photographs. (J23)

235-J. Rapid Heating of Forging Die Blocks. *Steel Processing*, v. 41, Sept. 1955, p. 576-578.
New, gas-fired process heats four or five times faster than conventional methods. Photographs, graphs. (J general, F22, TS)

236-J. The Metallographic View. XIV. Hardenability. Howard E. Boyer. *Steel Processing*, v. 41, Sept. 1955, p. 586, 597.
Explains hardenability and shows influence of carbon in steel alloys. Graphs. (J26, CN, AY, C)

237-J. Heat Treatment of Air Hardening Alloys on Welding. J. J. B. Rutherford and J. F. Ewing. *Welding Journal*, v. 34, Oct. 1955, p. 476S-483S.
Test program demonstrates need for post-weld heat treatment and influence of preheating temperature on hardness and microstructure. Graphs, micrographs, table. 2 ref. (J general, K general, M27, CN, AY)

238-J. Salt Bath Furnaces for Heat Treatment of Aluminum Alloys. Bernard P. Planner. *Western Machinery and Steel World*, v. 46, Sept. 1955 p. 92-95.
Of great interest to aircraft manufacturers, these furnaces, if properly built and intelligently operated, are safe. Table, graphs, diagrams, photograph. 3 ref. (J2, Al)

239-J. Gas Carburizing Practice. L. G. W. Palethorpe. *Wild-Barfield Heat-Treatment Journal*, v. 5, Sept. 1955, p. 2-7.
Furnace equipment, case depth obtained with drip feed and generator gas atmospheres. Tables, diagram, photographs, micrograph. (J28)

240-J. Influence of Continuous Annealing on the Mechanical Properties of Deep-Drawing Steel Strip With Various Preliminary Treatments. E. Schauff. *Henry Brutcher Translation No.* 3558, 20 p. (From *Stahl und Eisen*, v. 69, no. 2, 1949, p. 49-53.) Henry Brutcher, Altadena, Calif.
Previously abstracted from original. See item 18B-52, 1949. (J23, F23, G general, ST)

241-J. (French.) The Tempering of Cold-Worked Metal by Low-Temperature Annealing. Aurel Berghezan and Jean Herenguel. *Comptes rendus*, v. 241, no. 5, Aug. 1, 1955, p. 492-494.
Study of the change of structure by rolling and of the mechanical properties by restoration from 225 to 300° C., with an aluminum-magnesium homogeneous solid solution in pure metals with 3% magnesium. Graph. 10 ref. (J23, J29, F23, Q general, Al)

242-J. (French.) A 450-Kw. Electric Bell Furnace for the Annealing of Steel Bars. *Journal du Four Electrique*, v. 64, no. 4, July-Aug. 1955, p. 135-137.
Characteristics of the furnace. A homogeneous annealing is obtained without oxidation or decarburization and without loss of material by scaling. Photographs, graph. (J23, ST)

243-J. (German.) Effect of Activating Additions in Solid Case Hardening Compounds for Cementation of Steels. Hans Schrader. *Archiv für das Eisenhüttenwesen*, v. 26, no. 9, Sept. 1955, p. 527-533.
Investigates activation effect of oxides and carbonates of alkaline earths and alkali metals in charcoal case hardening compounds. Tables, graphs, 12 ref. (J28, ST)

244-J. (German.) Steel Castings for Double-Duro Hardening. Walther Hiller. *Giesserei*, v. 42, no. 18, Sept. 1, 1955, p. 465-466.
Influence of composition of medium carbon steel on the depth of hardening; critical analysis of steels used in Germany for this purpose. Table, graph. 2 ref. (J28, CI)

245-J. (German.) Hardenability Investigations on Cast Iron. Rudolf Dicke and Hans Schiffers. *Giesserei*, v. 42, no. 19, Sept. 15, 1955, p. 501-506.
Composition of test pieces and methods of testing, comparison of heating furnaces and burners, temperature and size of graphite used. Diagram, table, photographs, graphs, micrographs. 2 ref. (J26, CI)

246-J. (German.) Induction Hardening of Large Pieces. G. W. Seulen. *VDI Zeitschrift*, v. 97, no. 25, Sept. 1, 1955, p. 869-876.
Method, operational instructions, cooling installation, influence of different sizes of installation in the process of hardening. Graphs, diagrams, photographs. 9 ref. (J2, ST)

K
Joining

422-K. Toroidal-Type Current Meter Improves Weld Quality. Paton M. Zimmerman. *General Motors Engineering Journal*, v. 2, Sept.-Oct. 1955, p. 11-14.
Development and performance of a meter which provides a simple and convenient means of measuring actual welding current at electrode tips of welding machine. Photographs, diagram. (K3)

423-K. Resistance Welding Simplifies Presswork. J. H. Bauer. *Iron Age*, v. 176, Sept. 8, 1955, p. 80-81.
Seam welding eliminates deep drawing operations and permits savings in sheet steel. Photographs. (K3, ST)

424-K. Induction Machine Pressure Welds Shafts Without Flash. D. L. Hansen. *Iron Age*, v. 176, Sept. 15, 1955, p. 144-145.
Special machine joins cupped ends, speeds production, eliminates flash problem. Photographs. (K6, ST)

425-K. Solderability: Many Factors Affect Joint Quality. Harry Schwartzbart. *Iron Age*, v. 176, Sept. 22, 1955, p. 110-113.
Covers wettability, temperature,

time, capillarity and surface roughness of base metal. Photograph, graphs, diagram. 9 ref. (K7)

426-K. Field Welding on Oilfield Tubular Goods. J. N. Biron and B. G. Frazier. *Journal of Petroleum Technology,* v. 7, Sept. 1955, p. 29-32.

Nontechnical approach to effects of welding oil-well equipment shows that such steels require a stricter procedure for quality welds than steels in general industrial use; recommendations are made accordingly. Photographs, tables, graphs. 2 ref. (K general, AY)

427-K. Welding Comes of Age—New Applications. John L. Lang. *Mechanical Engineering,* v. 77, Sept. 1955, p. 782-784.

New and larger applications of the several electric welding processes. Photographs. (K1)

428-K. Principles of Production Welding. Morris D. Thomas. *Mechanical Engineering,* v. 77, Sept. 1955, p. 785-788.

Seven steps to successful production outlined and discussed. Photographs. (K1)

429-K. Special Techniques Braze Leakproof Aluminum Manifolds. Nagle V. Gusching and John Obrebski. *Metalworking Production,* v. 99, Sept. 2, 1955, p. 1557-1560.

Equipment and techniques for joining channelled "sandwiches" of aluminum for hydraulic manifolds. Photographs, diagrams. (K8, Al)

430-K. Mild Steel Welding in Carbon Dioxide Atmospheres. R. W. Tuthill. *Welding and Metal Fabrication,* v. 23, Sept. 1955, p. 335-338.

Methods, equipment, applications. Photographs, graphs. (K1, CN)

431-K. (Czech.) **Welding of Aluminum and Copper by Low-Temperature Heat and Pressure.** Jiri Hoskovec and Vaclav Pilous. *Zvaranie,* v. 4, no. 5, May 1955, p. 150-155.

Transition pieces of the metals are carefully heated to a little below the melting point of aluminum and finely pressed together. Diagrams, photographs, table. (K5, Al, Cu)

432-K. (Czech.) **Program for the Production of Filler Materials for Electric Arc and Flame Welding.** Antonin Kleander. *Zvaranie,* v. 4, no. 6, June 1955, p. 169-186.

Czechoslovak standards for welding rods, wires and electrodes, including welding properties, techniques, fluxes, strength standards of resulting welds, structures and metals, and where a particular welding electrode is to be used. Tables. (K1, K2, ST, AY)

433-K. (Russian.) **Continuous Flash Welding of Boiler Pipe of Low-Carbon and Low-Alloyed Steel.** N. S. Kabanov and E. S. Slepak. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 1-3.

Relation between impact strength of metal, in welded union, to various factors; comparison of distribution of impact strength when continuous flash welding is used and when there is preheating; other mechanical properties of the steel tubing and its microstructure. Graphs, tables, micrographs. 1 ref. (K3, Q6, M27, ST)

434-K. (Russian.) **Effect of the Direction of the Welding Current on the Formation of the Molten Zone of a Spot-Welded Joint.** N. Kh. Andreev. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 4-6.

Factors affecting choice of polarity in spot welding various alloys on d.c. machines; macrostructure of cores in fused zones. Photographs, diagrams. (K3, M28, Mg)

435-K. (Russian.) **Cooling Thin Steel Sheets in the Case of Spot Welding.** S. A. Adasinskii. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 6-8.

Calculations of very rapid cooling required after current is turned off; effect of factors such as contact time; heat distribution in the cross section. Diagrams, graphs. 4 ref. (K3, ST)

436-K. (Russian.) **Some Laws on Element Transfer From the Electrode Coating Into the Metal Weldment.** V. A. Lapidus. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 14-16.

Transfer of tungsten, chromium, vanadium and carbon in relation to the marble ($CaCO_3$) content of the electrode covering. Tables, graphs. 3 ref. (Kl, W, Cr, V)

437-K. (Russian.) **Arc Welding of Copper by Copper Electrodes.** I. P. Doronin and V. M. Sventitskii. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 17-19.

Advantages over gas welding, including minimizing porosity in welded seams; use of silicon-manganese-aluminum alloy (simanal) as deoxidizing agent and other substances; strength, microstructure, other properties of weld. Tables, photographs. 3 ref. (K1, Cu)

438-K. (Russian.) **Investigation of the Butt-Welding of Tubing Made From Steels 12X5MA and 1X18H9T.** F. I. Kisliuk. *Svarochnoe proizvodstvo,* 1955, no. 8, Aug., p. 20-23.

Welding conditions recommended for heat treated and non heat treated joints; resulting mechanical properties and corrosion resistance. Tables, graphs, photographs. (K1, AY)

439-K. (Slovak.) **Effect of Certain Factors on the Welding Properties of Coatings and Fluxes.** Jan Wegrzyn. *Zvaranie,* v. 4, no. 5, May 1955, p. 136-141.

Classification of coatings and fluxes, according to physical, chemical and metallurgical properties; effect of silicon dioxide on notch toughness of resulting weld; effects of oxides of calcium, manganese, iron and magnesium, sodium and potassium; degree of basicity or acidity of fluxes; ionization capacity; other properties. Photographs, oscillograms, tables. (K1, ST)

440-K. Static and Fatigue Strength of Fillet-Weld Connections Between Rolled Angle Sections and Gusset Plates. F. Koenigsberger and H. W. Green. *British Welding Journal,* v. 2, Sept. 1955, p. 369-372.

Whereas proportioning of welds is of no consequence, position of welds may influence fatigue strength. Diagrams, photographs, table, graph. 3 ref. (K9, Q7, ST)

441-K. Some Applications of Welding in the Development of Atomic Energy. L. Rotherham. *British Welding Journal,* v. 2, Sept. 1955, p. 377-383.

Review of Britain's atomic energy factories, descriptions of method for pressure welding of stainless steel pipe and technique for positional welding of aluminum pipe. Diagrams, photographs. (K general, Al, SS)

442-K. Lead-to-Pin Soldering by Resistance and Conduction Methods. Donald L. Driscoll. *Electrical Manufacturing,* v. 56, Oct. 1955, p. 168-170.

Comparative applications of both techniques to the soldering of typical connectors shows results in favor of resistance methods. Principal benefits include improved joint quality, lower production costs, increased operator safety. Photographs, table. (K7)

443-K. Shop Fabrication of Welded Steel Water Mains. H. C. Von Blohn. *Iron and Steel Engineer,* v. 32, Sept. 1955, p. 106-110; disc., p. 110-111.

Submerged arc welding enables fabrication of large diameter pipe and fittings. Photographs. (K1, F26, ST)

444-K. Maintenance Welding of Heavy Sections. R. E. Metius. *Iron and Steel Engineer,* v. 32, Sept. 1955, p. 113-118; disc., p. 118.

Electric welding has progressed from last-resort method of repair to first-resort maintenance tool. Article discusses many applications. Photographs, diagrams. (K1, ST)

445-K. Induction Brazing. I. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.),* v. 27, Sept. 10, 1955, p. 77-80, 84.

Discusses other methods including torch, furnace, salt bath, dip and resistance brazing. (To be continued.) (K8)

446-K. How Welded Chain Is Tested. H. F. Reid, Jr. *Materials & Methods,* v. 42, Sept. 1955, p. 114-116.

Both destructive and nondestructive tests are used to assure top quality and uniformity of materials. Photographs. (K9, S13)

447-K. Selection of Electrodes for Manual Arc Welding of Low-Carbon Steel. *Metal Progress,* v. 68, Aug. 15, 1955, p. 158-168.

Factors in selection (e.g., compotion, thickness, layout, speed of welding, and economics). Tables, diagrams, graphs. (K1, CN)

448-K. Welding and Joining. A. B. Kinzel. *Metal Progress,* v. 68, Sept. 1955, p. 129-132.

Trends and future prospects. The specialty welding of 25 years ago has become routine, the submerged arc and inert gas-shielding have sparked a minor revolution in the industry, new design concepts have resulted from welding research. Photographs. (K general)

449-K. Tig Welding Zinc Alloys. Lloyd Joy. *Welding Engineer,* v. 40, Oct. 1955, p. 47-48.

Tungsten inert-gas process uses alternating current with superimposed high-frequency stabilization. Photographs. (K1, Zn)

450-K. Filler Metals for Joining. Orville T. Barnett. *Welding Engineer,* v. 40, Oct. 1955, p. 49-51.

Properties, composition and advantages of various welding electrodes for joining steel. Tables. (K1, ST)

451-K. Consumable-Electrode Inert-Arc Spot Welding. R. L. Hackman. *Welding Journal,* v. 34, Sept. 1955, p. 839-845.

Process, advantages and limitations, applications, usefulness in terms of material types and thicknesses. Photographs, graphs. (K3)

452-K. Metallurgical Aspects of Silver Brazing Titanium. N. A. Tiner. *Welding Journal,* v. 34, Sept. 1955, p. 846-850.

Covers the inert-gas-shielded radiant-heat, induction and inert-gas tungsten-arc brazing processes. Photograph, graph, micrographs. 5 ref. (K8, Ag, Ti)

453-K. Spot Welding of Structural Applications in Airframe Manufacturing. W. R. Gain. *Welding Journal,* v. 34, Sept. 1955, p. 851-860.

High quality and consistency are assured through understanding of and careful adherence to procedures developed over years of investigations and research. Photographs, oscillographs, graphs, table, diagrams. 3 ref. (K3)

454-K. Evaluation of Fuels and Oxidants for Welding and Associated Processes. W. B. Moen and J. Campbell. *Welding Journal,* v. 34, Sept. 1955, p. 870-876.

An improved method of comparing and evaluating combinations for gas heating applications. Product of normal burning velocity and heating value of combustible mixture is a more significant parameter than flame temperature. Graphs, tables. 9 ref. (K2)

455-K. Welding of Chrome-Moly Steels in High Pressure High-Temperature Service. C. D. Cooper. *Welding Journal,* v. 34, Sept. 1955, p. 882-884.

Designed for reverse polarity, direct current welding in all positions. Photographs. (K1, AY)

456-K. A Comparative Study of European Welding Operations. R. W. Clark, S. A. Greenberg and C. E. Jackson. *Welding Journal,* v. 34, Oct. 1955, p. 935-953.

Report of three United States members of mission which spent four weeks visiting plants and conferring with welding experts in 11 European countries. Photographs. (K general)

457-K. High-Speed Welding of Gage Material. R. A. Kubli and T. J. McElrath. *Welding Journal,* v. 34, Oct. 1955, p. 978-987.

Submerged arc welding and inert gas-shielded processes can be used. Photographs, graph, diagram. (K1)

458-K. Nitrogen Effects in Argon Arc Welding Atmospheres. H. C. Ludwig. *Welding Journal,* v. 34, Sept. 1955, p. 409S-414S.

High argon purity is required for shielding steel welding arcs. Graphs, table, micrographs. 6 ref. (K1, ST)

459-K. Initial Characteristics of Chromium-Nickel Steel Weld Metals. J. Heuschkel. *Welding Journal,* v. 34, Oct. 1955, p. 484S-504S.

Controlled temperature unnotched tensile test used to study high-temperature brittleness of weld metals which may, under adverse conditions, lead to microfissuring, cracking or even rupturing. Photographs, tables, micrographs, graphs. 20 ref. (K9, AY)

460-K. Effects of Interstitial Elements on Weldability of Titanium Alloy Sheet. II. H. M. Meyer. *Welding Journal,* v. 34, Oct. 1955, p. 505S-517S.

Carbon, nitrogen and oxygen impair weldability under some conditions. Tables, micrographs, graphs. 9 ref. (K9, Ti)

461-K. Effect of Solubility of Alloying Elements Upon Weld Hot Cracking. B. I. Medovar. *Henry Brutcher Translation No.* 3554, 15 p. (From *Avto matícheskaya Svarka,* v. 8, no. 2, 1955, p. 79-90.) Henry Brutcher, Altadena, Calif.

Correlation of equilibrium diagrams with the effect of alloying elements upon the hot cracking tendency of low-carbon 18-8 and 25-20 steels and effect of titanium, zirconium and aluminum upon hot cracking tendency of welds in high nickel steels and alloys. Graphs, micrographs. 18 ref. (K9, M24, AY, SS)

462-K. (Czech.) Cold Pressure Welding of Aluminum and Copper. V. Pilous and J. Hoskovec. *Strojirenstvi,* v. 5, no. 3, Mar. 1955, p. 204-212.

Factors controlling welding results, design of welding stamps, methods of cleaning parts, pressure, temperature and speed of welding, previous heat treatment, mechanical tests of welded joints, corrosion and metallographic tests and theory. Diagrams, graphs, tables, micrographs, photographs. 4 ref. (K5, Al, Cu)

463-K. (French.) Cold Pressure Welding. J. Reinhold. *Soudage et Techniques connexes,* v. 9, nos. 7-8, July-Aug. 1955, p. 169-175; disc., p. 175-176.

Principal factors influencing quality of welds and weldability of various metals. Photographs, tables, diagrams. (K5, K9, Al, Cu, Fe)

464-K. (French.) Welded Bridges in France Since the Liberation. P. Widman. *Soudage et Techniques connexes,* v. 9, nos. 7-8, July-Aug. 1955, p. 185-198.

Welding equipment used in recent construction of railroad and highway bridges in France. Photographs. (K general, ST)

465-K. (German.) Modern Testing Method for Glass-Metal Joints by Use of Polarized Light. H. Herrmann. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 744-747.

Physical fundamentals of optical processes, cause of tension cracking of glass. Graphs, photographs. 9 ref. (K11)

L
Cleaning, Coating and Finishing

646-L. Aspects of Electrolytic Polishing. Cornelius A. Johnson. *AB Metal Digest,* v. 1, Sept. 1955, p. 3 + 4 pages.

Considers mechanism, qualities of bath, factors directly influencing results, preparation of several different samples. Graphs, diagrams. (L13)

647-L. World's Largest Plating Facility Is Fully Automatic. Thomas Mac New. *Automotive Industries,* v. 113, Sept. 15, 1955, p. 56-59, 118.

Set-up and operation of facilities for mass plating of vehicle bumpers. Photographs. (L17, Cr)

648-L. Corrosion Protection by Rubber. Acid and Alkali Resistant Protective Paints. I. Chlorinated Rubber Paints. W. L. Leo. *Corrosion Prevention and Control,* v. 2, Aug. 1955, p. 25-27, 50.

Presents a grouping of the various classes of corrosion conditions normally encountered and form of service required to be given by the protective coatings usually employed. (L26, R general)

649-L. Protection of Metals With Hypalon. H. J. Lanning. *Corrosion Prevention and Control,* v. 2, Aug. 1955, p. 30-32.

Properties of the material, its advantages and applications. Table. (L26)

650-L. Paint Faults and Remedies. XIII. Peeling. H. Courtney Bryson. *Corrosion Prevention and Control,* v. 2, Aug. 1955, p. 43-46.

Cause of peeling on various surfaces and methods of preventing the occurrence. (L26)

651-L. It's Easy to Remove Weld Discoloration From Stainless Steel. W. E. McFee. *Finish,* v. 12, Oct. 1955, p. 29, 46.

Alternating current electrolytic process is used. Photograph. (L13, K general, SS)

652-L. Planishing Improves Weld Seam Quality. Gilbert C. Close. *Finish,* v. 12, Oct. 1955, p. 40-41, 104.

Seam is fed between pair of pressure rolls and enough force is applied to crush weld metal flush with parent surface. Photographs. (L10, K3)

653-L. Plastisols: Versatile, Low-Cost Protective Coatings. D. R. Meserve. *Iron Age,* v. 176, Sept. 8, 1955, p. 77-79.

Various forms of plastisols can be compounded to varying degrees of hardness or to resist particular corrosive conditions. In colored form they improve product appearance. Photographs. (L26)

654-L. Pre-Finished Metals Combine Attractiveness With Savings. J. B. Mohler. *Iron Age,* v. 176, Sept. 22, 1955, p. 107-109.

Precoating can be combined with mechanical prefinishing of sheet and strip materials. Properties and uses of the ready-to-use sheet and strip materials summarized and discussed. Photographs, tables. (L general)

655-L. Complex Transmission Castings Cleaned, Descaled Electrolytically. J. Birnbaum. *Iron Age,* v. 176, Sept. 22, 1955, p. 116-118.

Automatic conveyorized unit cleans a work fixture of cast parts every 1 to 2 min. Subsequent machining is made easier. Photographs. (L13, G17, CI)

656-L. Crack-Free Chromium. *Metal Industry,* v. 87, Sept. 9, 1955, p. 223-234.

Coating deposited directly on steel has low coefficient of friction, excellent adhesion, nongalling surface, superior ductility and attractive light grey matte surface that can be buffed to high luster. Micrographs. (L17, Cr, ST)

657-L. Factors Influencing the Unrubbed Glossiness of Metal Lacquers. G. N. Bruxelles and B. H. Mahlman. *Paint and Varnish Production,* v. 45, Sept. 1955, p. 23-32.

Effects of evaporation rate and composition of solvent blend, application technique, roughness of substrate material and of primer film surface, and swelling action of lacquer solvent on primer on the glossiness of a single nitrocellulose lacquer solids composition applied by automatic spray equipment. Tables, photographs. 1 ref. (L26)

658-L. Abrasive Belt Polishing. Lee Vorce. *Steel,* v. 137, Sept. 5, 1955, p. 86-89; Sept. 19, 1955, p. 132-134.

Advantages over abrasive wheels and utilization of various types of belts and contact wheels. Considers part shape, material, finish and production required. Table, photographs, diagrams. (L10)

659-L. A Modern Pickling and Surface Treatment Shop for Nickel Alloys and Stainless Steels. Marcel Perret. *Wire and Wire Products,* v. 30, Sept. 1955, p. 1003-1009, 1063-1065.

Equipment and procedures for processing nickel alloys, stainless and heat resisting steels in wire, strip, tubes and bars at a new French plant. Photographs, diagrams. (L12, Ni, SS)

660-L. Adhesion of Electrolytic Zinc Deposits to Iron. K. M. Gorbunova and P. D. Dankov. *Henry Brutcher Translation No.* 3549, 8 p. (Abridged from *Zhurnal Fizicheskoi Khimii,* v. 27, no. 11, 1953, p. 1725-1730.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 363-L, 1954. (L17, Fe, Zn)

661-L. Acidless Chemical Process for Descaling of Stainless and Heat-Resisting Steels. B. Wenderott. *Henry Brutcher Translation No.* 3553, 11 p. (Condensed from *Stahl und Eisen,* v. 75, no. 3, 1955, p. 141-144.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 235-L, 1955. (L12, SS, AY)

662-L. Structure of Layers Produced by Electrospark Hard Facing (of Tool Steels) With Different Cemented Car-

bides. E. Bryjak and W. Missol. *Henry Brutcher Translation No.* 3569, 16 p. (Abridged from *Hutnik*, v. 22, no. 3, 1955, p. 77-86.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 440-L, 1955. (L general, M27, M28, C-n)

663-L. (Czech.) **New Information on the Surface Treatment of Tools.** St. Blazek. *Strojirenstvi*, v. 5, no. 5, May 1955, p. 362-366.

Experiments with AP 1005 surface treatment; theory of the process and metallographic analysis; effect of heat treatment on the final results; service life increased by phosphatization. Micrographs. 15 ref. (L14, ST)

664-L. (French.) **Cleaning by Ionic Attack for Metallographic Observations With the Photo-Emission Electron Microscope.** E. Louis Huguenin and Maurice Gauzit. *Comptes rendus*, v. 241, no. 4, July 25, 1955, p. 378-380.

Use of an ion gun, a discharge tube and pulverization in the discharge tube, followed by bombardment with the gun, for cleaning. Diagram, micrographs. 2 ref. (L13, M21)

665-L. (German.) **New Method of Polishing Aluminum.** W. Burkart. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 436-442.

Polishing rings used in conjunction with an emulsion sprayed onto surface of disk. To provide better matching of polisher speed to diameter of polishing wheels, machines are available in which speed is infinitely variable. Photographs, diagrams. (L10, Al)

666-L. (German.) **Mechanical Descaling of Wire Rod by Bending.** Clemens Eisenhuth. *Stahl und Eisen*, v. 75, no. 17, Aug. 25, 1955, p. 1092-1099.

Physical prerequisites for the removal of the scale; weight losses in mechanical descaling; relations between surface and drawing solid lubricants; back pull caused in mechanical descaling by bending. Table, graphs, photographs. (L10, ST)

667-L. (Russian.) **Lac-Dye Materials for the Anticorrosion Protection of Equipment and Metallic Structures Used in Manufacturing Sulfuric Acid and Superphosphates.** A. I. Reibman and M. I. Finkel'shtein. *Khimicheskaia promyshlennost'*, 1955, no. 3, Apr.-May, p. 150-152.

Use of protective layers and combinations, under various operating conditions, including copolymers of chlorvinyl with vinylidene chloride, perchlorvinyl resin and chlorinated rubber, bakelite, enamel, varnishes and lacquers. (L26)

668-L. (Russian.) **Periodic Phenomena in the Electrolytic Deposition of Cadmium in the Presence of Alcohols.** D. N. Gritsan, D. S. Shun and B. M. Bulgakov. *Zhurnal fizicheskoi khimii*, v. 29, no. 6, June 1955, p. 953-958.

Periodic fluctuations of cathode potential during deposition of cadmium from solutions of cadmium sulfate; effect of alcohol concentration and current density. Oscillograms, table, circuit diagram, 9 ref. (L17, Cd)

669-L. (Russian.) **Causes for the Formation of Sponge on the Cathode During Zinc-Plating From Acid Solutions in the Presence of Salts of Electropositive Metals.** N. T. Kudriavtsev and A. G. Atanasiants. *Zhurnal fizicheskoi khimii*, v. 29, no. 7, July 1955, p. 1227-1235.

Influence of metal salts, more electropositive than zinc, on the nature of its surface change and on the electrode potentials during electrolysis and in the presence of current in zinc electrolytes. Formation on zinc in the presence of copper, antimony and arsenic salts, with and without current flow. Graphs, table. 9 ref. (L17, Zn)

670-L. Hydrogen Contamination in Descaling and Acid Pickling of Titanium. G. A. Lenning, C. M. Craighead and R. I. Jaffee. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 33, 1955, 10 p.

Significant hydrogen absorption in titanium can occur in a sodium hydride descaling bath and in a 10% nitric, 2% hydrofluoric acid pickle. The amount of hydrogen absorbed increased with increasing ratio of surface area to mass and also with time in the baths. There was a minimum at about 800° F. in the hydrogen pickup from the sodium hydride descaling bath. Tables. 4 ref. (L12, Ti)

671-L. What You Should Know About Clad Steels. Henry F. Peters. *Chemical Engineering*, v. 62, Oct. 1955, p. 234 + 4 p.

Properly selected cladding material will prevent or reduce corrosion, abrasion or oxidation, prevent contamination of substance in contact with metal and supply desired properties such as high strength and good electrical conductivity. Photographs, table, diagrams. (L22, R general, Q23, P15, ST, SS, Ni)

672-L. Electron Microscope Studies on Copper Deposits From Sulfate and Cyanide Baths. Shinzo Okada and Saburo Magari. *Electrochemical Society, Journal*, v. 102, Oct. 1955, p. 580-585.

At low current densities, deposits on different cathodes are not uniform. Micrographs, reflection patterns, tables, diagrams, 6 ref. (L17, M27, Cu)

673-L. Bright Nickel Plating Solutions. T. E. Such. *Electroplating and Metal Finishing*, v. 8, Sept. 1955, p. 308-315.

Different types of fully bright and semibright solutions, relative advantages and disadvantages in relation to brightness, levelling, ductility and residual stress. Tables, graphs. (To be continued.) (L17, Ni)

674-L. High Efficiency Gas Heated Plant in Metal Finishing. A. E. Tyrrell. *Electroplating and Metal Finishing*, v. 8, Sept. 1955, p. 316-318.

Efficiency increased by insulating tank, covering solution with floating plastic tubes and immersing tubes. Photographs, tables, diagram. (L general)

675-L. Metal Spraying and Its Applications. W. E. Ballard. *Industrial Finishing, (London)*, v. 9, Aug. 1955, p. 26-28.

History up to latest automatic methods. Micrograph, photographs. (L23)

676-L. Prevention of Paint Failures. IV. Faults Due to Application and Misuse of Materials. *Industrial Finishing (London)*, v. 9, Aug. 1955, p. 32, 34-36.

Deals with effective storage, thinning of paint, pretreatment and organization of workshop. Photographs. (L26)

677-L. Modern Ferrous and Non-Ferrous Pickling Speeded With Cast Corrosion Resistant Alloys. *Industrial Heating*, v. 22, Sept. 1955, p.1796 + 6 pages.

Capable of being placed in a continuous production line, this pickling process was possible because of availability of stainless steel pumps, flanges and valves which can handle highly corrosive pickling solutions. Photographs. (L12, SS)

678-L. Cermet Powder Combined With Ceramic Frit Provides Coherent Protective Coatings. *Industrial Heating*, v. 22, Sept. 1955, p. 1869 + 4 pages.

Discussion of National Bureau of Standards' cermet coating, M-60, that protects metal parts against oxidation at high temperatures. Photographs. (L27, R2, Cr, B, Ni)

679-L. Maintenance Painting in the Steel Industry. Cecil Schofield. *Iron and Steel Engineer*, v. 32, Sept. 1955, p. 65-73; disc., p. 73-74.

Performance specification of paint is preferred over formula specification because development of better paints is not handicapped and responsibility is on the paint supplier. Photograph. (L26, ST)

680-L. Use of Heavy Cutback Asphaltum Mastic Coatings in Coke Plant Areas. Abner H. Bagenstose, Jr. *Iron and Steel Engineer*, v. 32, Sept. 1955, p. 75-78; disc., p. 78-80.

Because mastics can supplement paint to protect materials in bad corrosive areas, this article considers materials selection, surface preparation and application. Photographs. (L26, ST)

681-L. Absorption of Strontium and of Barium on Tungsten. George E. Moore and H. W. Allison. *Journal of Chemical Physics*, v. 23, Sept. 1955, p. 1609-1621.

Deposits on ribbon receivers by evaporation from source filaments could be cleaned by heating to high temperature; thus repeated tests were possible. Diagrams, graphs, tables. 41 ref. (L25, Sr, Ba, W)

682-L. A New Look at Electroformed Parts. H. D. Rice. *Materials & Methods*, v. 42, Sept. 1955, p. 99-101.

Used where exceptional surface finish or detail, high precision and complex internal design are required. Photographs, micrograph, table. (L18)

683-L. Tin-Nickel Alloy Plated Coatings. Robert T. Gore. *Materials & Methods*, v. 42, Oct. 1955, p. 102-105.

Appearance of consumer products and corrosion resistance of industrial parts are improved. Photographs, graph, tables. (L17, Ni, Sn)

684-L. Finishes for Metal Products. *Materials & Methods*, v. 42, Sept. 1955, p. 117-132.

Outlines major types of permanent finishes, including conversion, organic, metallic and inorganic coatings. Photographs. (L general)

685-L. Developments in Bi-Metallic Construction. *Mechanical World and Engineering Record*, v. 135, Sept. 1955, p. 414-415.

Intermolecular bonding (by tinning and casting process) of aluminum to steel and titanium permits adjustment of strength-weight ratio, cost, wear, and corrosion-resistant properties of vital machine parts. Diagrams, graph, photograph. 1 ref. (L22, Al, ST, Ti)

686-L. Progress in Metal Cleaning and Finishing. Abner Brenner. *Metal Progress*, v. 68, Sept. 1955, p. 113-117, 192, 194.

Electroplating of elements from aqueous solutions has about reached its limit; future developments will include wider use of alloy deposition and nonaqueous plating solutions. Photographs. (L general)

687-L. The Selection of Electroplated Coatings. *Metal Progress*, v. 68, Aug. 15, 1955, p. 97-105.

Topics such as influence of shape and galvanic corrosion in plating for protection, decoration or special purposes. Tables, graphs, photograph. (L17)

688-L. Metal Cleaning Costs. *Metal Progress,* v. 68, Aug. 15, 1955, p. 169-173.

Labor (direct and indirect), materials, power and equipment evaluated. Tables. (L10, L12, A4)

689-L. Recent Developments in Antifouling Paints. Allen L. Alexander. *Organic Finishing,* v. 16, Sept. 1955, p. 5-10, 12.

Exemplified by newer vinyl systems, these adaptable coatings with cathodic protection combat ship hull corrosion. Table, photographs, graphs. 4 ref. (L26, R10)

690-L. The Anodic Etch in Preparation for Plating. F. G. Brune and V. L. McEnally, Jr. *Plating,* v. 42, Sept. 1955, p. 1127-1132.

Sulfuric acid-epsom salt solution is used to prepare ferrous parts for good adhesion with nickel coat and other plating. Micrographs, tables, phase diagrams, photograph. 30 ref. (L19, L17)

691-L. Lead-Tin-Antimony Plating. Reginald T. Putnam and Elijah J. Roser. *Plating,* v. 42, Sept. 1955, p. 1133-1136.

Describes control precedures and solution developed to plate a lead base alloy containing 11% tin and 7% antimony; effect of variations of plating conditions and solution composition. Graphs, diagram, photograph, table. (L17, Pb, Sn, Sb)

692-L. Metal Cleaning Studies Using Radioactive Tagged Soils. James W. Hensley and Russell D. Ring. *Plating,* v. 42, Sept. 1955, p. 1137-1143.

Some effects of electrocleaning variables are peculiar to fatty acid soil. Concentration and current density variations are different with tagged mineral oil soil. Photographs, graphs, diagram. 6 ref. (L general, S19)

693-L. Plating of Beryllium Copper. Simon J. Morana. *Plating,* v. 42, Sept. 1955, p. 1144-1148.

Since these alloys can be hardened by a simple heat treating operation, from a soft, workable state to levels of strength and hardness beyond those of other copper-base alloys, they are used extensively in automotive and electrical industries. Photographs. (L17, Cu)

694-L. Electrotinning of Copper Wire From the Stannous Fluoborate Bath. A. E. Carlson. *Plating,* v. 42, Sept. 1955, p. 1149-1150.

Because of the stability, high-speed characteristics, and simplicity of operation, other fluoborates are finding use in the wire industry. Photograph, table, micrograph. (L17, Sn, Cu)

695-L. Filtering of Chromic Acid Solutions. R. F. Ledford and Lloyd O. Gilbert. *Plating,* v. 42, Sept. 1955, p. 1151-1155.

Relative simplicity of chromic acid plating solution has detracted from the importance of filtering. Discussed are operation and construction of filtration equipment as well as several applications. Photographs, graphs, diagram, table. 2 ref. (L17, Cr)

696-L. Degreasing Systems and Their Choice. D. J. Fishlock. *Product Finishing,* v. 8, Sept. 1955, p. 50-55.

Chemical (alkali) cleaning, electrocleaning methods, inspection and control. Diagram, photographs. (L12, L13)

697-L. Diffusion Coating With Metallic Halides. I. Theoretical Considerations. I. Jenkins. *Product Finishing,* v. 8, Sept. 1955, p. 61-67.

Newer processes of solid-gas diffusion coating reactions. Types of coatings, principles, halide chemistry, complex metal coatings, metallic carbonyls. Diagram, graphs, micrographs. (To be continued.) (L15)

698-L. Recent Developments in Stoving Phenolic Coatings. G. Barnett and K. D. Drakeley. *Product Finishing,* v. 8, Sept. 1955, p. 68-75.

Poor flexibility and alkali resistance of phenolic coatings improved by combining with polyamines or epoxides. Photographs, tables. (L26)

699-L. From Semi to Full Automatic Plating. Fred G. Brune. *Products Finishing,* v. 20, Oct. 1955, p. 44-54, 56.

Factors to be considered including space requirements, possible savings. Photographs, diagram, tables. (L17)

700-L. More Life for Plating. F. L. Scott. *Steel,* v. 137, Sept. 26, 1955, p. 116-117.

Because they stick tight and resist wear, organic coatings, applied over electroplated zinc and chromium, are effectively preventing corrosion. Photograph. (L26, Zn, Cr)

701-L. Protective Coatings for Corrosion Control. N. T. Shideler. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 102, v. 48, no. 10, Aug. 1955, p. 20-32.

Surface preparation, application and properties of drying oil base, oleoresinous, synthetic and bituminous coatings. 6 ref. (L26)

702-L. A New Face Toughens Forge Dies. *Welding Engineer,* v. 40, Oct. 1955, p. 60-61.

Hard facing top and bottom of dies for 1000-ton press has increased normal service life from 4 to 18 times. (L24, F22, SS)

703-L. Surfacing With Composite Tube Rod. R. P. Culbertson. *Welding Journal, v.* 34, Sept. 1955, p. 861-869.

Preblended metal powders, in a continuously formed mild steel tube, are used for automatic hard facing and surfacing applications. Photographs, micrographs, tables. (L24, AY)

704-L. Finishing and Plating of Metal Powder Parts. Charles C. Cohn. *Proceedings,* Eleventh Annual Meeting of Metal Powder Association, v. I, p. 6-11; disc., p. 11-13.

Factors in making component, ideal conditions for filling pores, knowledge a plater should have, summary of factors to consider before plating, anodizing, oxidizing, phosphatizing, chromatizing and conversion coating. Micrographs. (L general, H general)

705-L. Hot and Cold Ductility of Calorized Coatings. S. G. Bogdanov. *Henry Brutcher Translation No.* 3530, 8 p. (Abridged from *Vestnik mashinostroeniya,* v. 32, no. 9, 1952, p. 48-54.) Henry Brutcher, Altadena, Calif.

Aluminum-impregnated steel surfaces, hot worked without scaling or other damage, show increased resistance to corrosion by water, air (ordinary and elevated temperatures) and performance under various conditions. Tables, diagram, micrographs, photographs. (L15, Q23, ST, Al)

706-L. (German.) **Corrosion Preventing Agent With a Limited Protective Action.** Wilfred Pohl. *Erdöl und Kohle,* v. 8, no. 8, Aug. 1955, p. 552-556.

Different corrosion preventing agents, mainly of a greasy constitution for application in storing, transportation and during production. Also gives suggestions for selection of various types of compounds. Table. (L26)

707-L. (German.) **The Importance of the Metallizing Technique for Maintenance Work in Iron and Steel Works.** Josef Wingerath and Friedrich Wilhelm. *Stahl und Eisen,* v. 75, no. 18, Sept. 8, 1955, p. 1189-1197.

Important fields of application to repair work and requirements to be met by sprayed metals with different forms and conditions of design. Diagrams, photographs. 6 ref. (L23, ST)

708-L. (Polish.) **Protective Coatings.** K. Körner *Technika lotnicza,* v. 10, no. 5, Sept.-Oct. 1955, p. 142-144.

Types of coatings and applications, especially for aircraft, anticorrosiveness and other characteristics. Table. 10 ref. (L general)

709-L. (Book.) **Finishing Handbook and Directory, 1955.** I. S. Hallows, editor. 5th Rev. Ed. 483 p. 1955. Sawell Publications, 4 Ludgate Circus, London E.C.4, England.

Sections cover preparatory treatments, types of paint and application methods, selection of painting schemes, electroplating processes, finishes for aluminum alloys, zinc and flock coating, metallizing nonmetallic surfaces, vacuum deposition, and plastics. (L general, Al, Zn)

710-L. (Book—German.) **Preliminary Treatment of Ferrous and Nonferrous Metal Surfaces. Oberflächenvorbehandlung von Eisen- und Nichteisenmetallen.** Willi Machu. 801 p. 1954. Akademische Verlagsgesellschaft Geest & Portig K.-G., Leipzig, Germany.

Methods of cleaning with inorganic and organic chemicals, greasing and degreasing, etching, and mechanical and electrical treatment. (L general)

M

Metallography, Constitution and Primary Structures

310-M. Phase Equilibria in the System FeO-Fe_2O_3-SiO_2. Arnulf Muan. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 965-976.

Data obtained combined with previous published data to construct lines of equal O_2 pressures and lines of equal CO_2-H_2 mixing ratios along liquidus surface. Tables, diagrams. 16 ref. (M24, Fe)

311-M. Some Aspects of Slip in Germanium. R. G. Treuting. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1027-1031.

Single crystals, strained in tension at 600° C., undergo inhomogeneous deformation, after which structure is polygonized with domain size of 2 x 10^{-3} cm. Photographs, diagrams, table. 14 ref. (M26, Q24, Ge)

312-M. Zirconium-Columbium Diagram. B. A. Rogers and D. F. Atkins. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1034-1041.

Part of the constitution diagram of the alloy system lying above 610° C. has been established with reasonable accuracy. However, the positions of the solvus lines descending from the ends of the eutectoid horizontal remain to be

determined. Tables, X-ray defraction pattern, graphs, diagrams. 12 ref. (M24, Zr, Cb)

313-M. Lineage Structure in Aluminum Single Crystals. A. Kelly and C. T. Wei. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1041-1042.

X-ray method permits rapid survey of perfection of single crystal at a particular surface. Photographs. 8 ref. (M26, Al)

314-M. Calculation of the Entropies of Lattice Defects. H. B. Huntington, G. A. Shirn and E. S. Wajda. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1085-1091.

Method considers vibrations localized around defect as separate from elastic vibrations an appreciable distance away. Tables. 15 ref. (M26)

315-M. Lattice Vacancies and Interstitials in Metals. Harvey Brooks. Paper from "Impurities and Imperfections". American Society for Metals, p. 1-27.

Study of thermodynamic theory, formation energy and quantum mechanical calculations of vacancy and interstitial energies. Tables, graph. 28 ref. (M26, P12)

316-M. Dislocations. John C. Fisher. Paper from "Impurities and Imperfections". American Society for Metals, p. 28-40.

They provide a simple means for remembering important properties of crystalline material and causes of alloy strength. Diagrams, micrographs, graph. 2 ref. (M26)

317-M. New Solid State Remote Metallographic Facilities. M. J. Feldman. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 208-224.

For the purposes of redesign and extension, the remote metallographic process was divided into mechanical, chemical, and optical operation, with consideration given to the needs and modifications of each. Table, diagrams, photographs. (M21, M23)

318-M. (English.) **Difficulties in the Theory of Dislocations.** Nevill Francis Mott. Paper from "International Conference of Theoretical Physics, Proceedings". Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, p. 565-569; disc., p. 569-570.

Experimental evidence of slip lines; dislocation mechanisms; theoretical anomalies. Graph, diagram. 11 ref. (M26, Q24)

319-M. (English.) **Dislocation Networks in Crystals.** Taira Suzuki and Hideii Suzuki. Paper from "International Conference of Theoretical Physics, Proceedings". Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, p. 570-575; disc., p. 575-576.

Studies of space distribution and mesh size of dislocation networks. 10 ref. (M26)

320-M. (English.) **What Can the Electron Microscope Teach Us About the Quality of Metals and Metal Products.** D. A. Beekhuis and J. B. Le Poole. Paper from "Rapport Europees Congres toegepaste Electronenmicroscopie". Rijksuniversiteit, p. 173-181.

The electron microscope as a tool for analysis of metallurgical failure and for prediction of a metal's performance in a given application. Micrographs. 11 ref. (M21)

321-M. (French.) **Phase Diagrams of Cryolite and Aluminate-Base Systems.** Etienne Bonnier. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 39-43; disc., p. 43.

Pure natural crystalline cryolites which allow the best reproducibility were used; their melting points were all between 998 and 1000° C. Sodium aluminates were prepared by a wet process, by sintering at 1100° C, or as *in situ* reaction between Al_2O_3 and Na_2CO_3. Graphs. 12 ref. (M24, N12, Al)

322-M. (French.) **A New Method for the Study of Aluminum and Its Alloys by Electron Diffraction.** Jean-Jacques Trillat. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 283-288.

Method of recording, continuously, the structural changes of light alloys and observing chemical reactions. Diagrams, photographs. 10 ref. (M22, Al, Cu)

323-M. (French.) **Application of Etch Figures to the Study of Structural Modifications of Aluminum and Its Alloys.** Gérard Wyon and Paul Lacombe. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 289-304; disc., p. 304.

Use of etch figures in microscopic metallography to study such problems as differentiation of grain and subgrain boundaries proceeding from the fragmentation or coalescence creep tests and the distribution of impurities (and even of their condition in the crystal lattice) based on the location and appearance of the etch figures. Micrographs, graph, photographs. 34 ref. (M21, M27, Al)

324-M. (French.) **Liquation and Equilibrium Diagrams: Applications to the Diagram of Aluminum-Iron-Silicon Alloys.** Marcel Armand. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 305-327; disc., p. 327.

Advantages of the liquation method, which depends essentially on slowly cooling the molten alloys and sampling at different stages of solidification. Graphs, tables, X-ray diffractograms, micrographs, photographs. 19 ref. (M24, Al, Fe, Si)

325-M. (French.) **Some Aspects of Industrial 2% Copper Beryllium Alloys With the Electron Microscope.** A. Saulnier. Paper from "Rapport Europees Congres toegepaste Electronenmicroscopie". Rijksuniversiteit, p. 183-193.

Method of testing industrial specimens of beryllium bronzes in the electron microscope to determine influence of annealing treatments at around 600° C. and the influence of cold working between quenching and annealing. Micrographs, diagram. 3 ref. (M27, J23, Cu)

326-M. (French.) **Influence of Attack in Electron Metallography.** L. Habraken. Paper from "Rapport Europees Congres toegepaste Electronenmicroscopie". Rijksuniversiteit, p. 207-215.

Role of the reagent in the etch solution and the solvent in electron metallography. Micrographs. (M21)

327-M. (French.) **Special Structural Characteristics of Hard WC-TiC-TaC-Co Alloys Seen by the Electron Microscope.** R. Bernard and S. Bernard. Paper from "Rapport Europees Congres toegepaste Electronenmicroscopie". Rijksuniversiteit, p. 217-221.

Simplified technique of double silica replica on plexiglas to study polished and attached surfaces of the alloys. Micrographs. 3 ref. (M21, M27, SG-m)

328-M. (French.) **Very Fine Oriented Structures Observed by Electron Microscopy on the Faces of Crystals of Aluminum and Its Alloys.** P. Bussy. Paper from "Rapport Europees Congres toegepaste Electronenmicroscopie". Rijksuniversiteit, p. 347-351.

Etch-figure method to explain above phenomena. Micrographs, diagram. 9 ref. (M21, M27, Al)

329-M. (German.) **Structure and Determination of the Thickness of Zinc Coatings.** Walter Katz. *Stahl und Eisen,* v. 75, no. 17, Aug. 25, 1955, p. 1101-1106.

Results of tests on galvanized sheets of different manufacturers, detection of defects and irregularities in the coat, results of tests on galvanized wires, equipment for the electrochemical determination of the thickness of the coat layer. (M27, S14, Sn)

330-M. (German.) **Danger of Excessive Crystal Growth in Aluminum Cast Alloys.** Hermann Kessler and Hans Ludwig Winterstein. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 545-546.

Formation of microfissures in aluminum-silicon alloys caused by contraction stress in the primary crystals. Micrographs. (M26, N12, Al, Si)

331-M. (German.) **Crystal Structure Investigation on Sintered Hard Metal Fracture.** Hermann Pfisterer and Hildegard Kasperek. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 574-578.

Structures of tungsten carbide + cobalt, titanium and tungsten carbides + cobalt, and tungsten, titanium and tantalum carbides + cobalt clarified by electron microscopy. Tables, micrographs. 9 ref. (M26, EG-d)

332-M. (Italian.) **Color Metallography of Ferrous Alloys.** A. Scortecci and C. Durand. *Metallurgia italiana,* v. 47, no. 7, July 1955, p. 305-308 + 8 plates.

General discussion of method and observations; bibliography. Tables, micrographs. 41 ref. (M23, Fe, ST, SS, Mn, CI)

333-M. (Russian.) **Nature of "Naphthalene-Like" [Transcrystal] Fracture of High-Speed Steel.** I. A. Geller. *Stal',* v. 15, no. 7, July 1955 p. 630-634.

In certain heat treatments or cold working, the steel develops a fracture across the grains which results from exceptionally coarse grains and the concomitant carbide precipitation. Micrographs, graph. 6 ref. (M27, N7, TS)

334-M. (Russian.) **Phase Analysis of Aluminum-Base Alloys.** N. I. Blok, O. A. Dubovikova-Khromova, and N. F. Lashko. *Zavodskaia laboratoriia,* v. 21, no. 8, Aug. 1955, p. 894-899.

Electrochemical separation of phases in aluminum alloys using anhydrous electrolytes; method developed for anode solution of aluminum-copper alloys by liquid nitrogen cooling during electrolysis; effect of aging on intermetallic phases; crystalline lattice of cast, pressed and heat treated aluminum alloy. Tables. X-ray, micrographs. 5 ref. (M26, M23, Al, Cu, Fe, Ni)

335-M. (Russian.) **Micro-Investigation of Steel in a Magnetic Field.** A. N. Cherviakov. *Zavodskaia laboratoriia,* v. 21, no. 8, Aug. 1955, p. 945-948.

Differentiation of the ferro from the nonferromagnetic phases (alpha from sigma) and determination of alpha phase in austenitic steels; magnetic structure and crystallographic orientation. Diagrams, micrographs. 7 ref. (M26, M23, AY, SS)

336-M. A Study of the Etching Rate of Single-Crystal Germanium. Paul R. Camp. *Electrochemical Society, Journal,* v. 102, Oct. 1955, p. 586-593.

Principal etchants were composed of only hydrogen peroxide (H_2O_2), hydrofluoric acid (HF) and water (H_2O). Graphs, tables. 4 ref. (M21, Ge)

337-M. Dislocations in Germanium. S. G. Ellis. *Journal of Applied Physics,* v. 26, Sept. 1955, p. 1140-1146.

Light microscope study of etched crystals has shown formation of small angle grain boundries and screw dislocations. Photographs, diagrams. 13 ref. (M26, Ge)

338-M. Screw Dislocations in Growth From the Melt. G. W. Sears. *Journal of Chemical Physics,* v. 23, Sept. 1955, p. 1630-1632.

Shown to operate for certain faces of lead iodide at small supercoolings. Photographs. 15 ref. (M26)

339-M. Macro-Etching of Iron and Steel. *Metal Progress,* v. 68, Aug. 15, 1955, p. 195-200.

Equipment, procedure and interpretation of results from simple qualitative technique. Tables, photographs. (M21, CI, ST)

340-M. A Quarter Century of Metallurgical Science. Cyril Stanley Smith. *Metal Progress,* v. 68, Sept. 1955, p. 137-140.

Past progress and present trends. (M general, N general, P general)

341-M. X-Ray Extinction and the Effect of Cold Work on Integrated Intensities. G. K. Williamson and R. E. Smallman. *Physical Society, Proceedings,* v. 68, no. 429B, Sept. 1955, p. 577-585.

Cold work reduces intensities of line by factor between 3 and 5%. Graphs. 8 ref. (M22, Cu, Al)

342-M. Report of AEC Cooperative Metallographic Group on Zirconium-Base Alloys. R. M. Treco, R. F. Dickerson and H. P. Roth. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission),* TID-5131, Mar. 1953, 61 p.

Detailed microstructures of dilute binary alloys of zirconium presented for various heat treatments. Information on preparation and examination of alloy samples. Table, micrographs. 16 ref. (M27, Zr)

343-M. (Czech.) Structure of Grey and White Cast Irons at High Temperatures. Ladislav Bezdek and Dalibor Ruzicka. *Slévarenstvi,* v. 3, no. 8, Aug. 1955, p. 225-233.

Special microscope, specimen preparation and techniques. Applied to study of primary austenite dendrite structure and other formations at 1000° C. Diagram, photograph, micrographs. (M21, M27, CI)

344-M. (French.) Conditions for the Appearance of the Exaggerated Growth of Crystals in Soft Iron. Pierre Coulomb and Paul Lacombe. *Comptes rendus,* v. 241, no. 5, Aug. 1, 1955, p. 494-496.

Results of tests in which soft iron was subjected to cold working by cold rolling, followed by pure and dry hydrogen annealing. Graph, table, microphotograph. 6 ref. (M26, N3, Fe)

345-M. (French.) Dilatometric Thermal Analysis of Samarium Ferrite and Magnetic Transitions of Rare Earth Ferrites. Georges Guiot-Guillain and Xavier Waché. *Comptes rendus,* v. 241, no. 6, Aug. 8, 1955, p. 550-552.

Dilatometric study of FeO_3-Sm_2O_3 makes it possible to reveal the difference in nature between certain transitions presented by this ferrite and other rare earth ferrites. Graph. 8 ref. (M23, Sa, Fe)

346-M. (French.) Recent Applications of X-Ray Diffraction to the Study of Metals. Gilles Pomey. *Métaux corrosion-industries,* v. 30, nos. 359-360, July-Aug. 1955, p. 304-312.

Use of X-ray diffraction in study of crystalline imperfections and preferential orientations. Development of intensity counters reviewed. Micrographs, diagrams. 19 ref. (M22)

347-M. (German.) The Iron-Phosphorus-Vanadium System. Berthold Stengel and Rudolf Vogel. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 547-554.

Results of microscopic and X-ray investigation of the three element system with up to 22% phosphorus and 60% vanadium content, the crystal formation of the phases in the system and the equilibrium condition and graphs in the system Fe-Fe_2P-V_2P-V. Graphs, tables, micrographs. 14 ref. (M24, Fe, V)

348-M. (German.) The Three-Element System: Cobalt-Chromium-Carbon. Werner Köster and Franz Sperner. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 555-559.

Microscopic, X-ray and magnetometric investigation to determine transformation and space condition in the system. Micrographs, tables, graphs. 12 ref. (M24, Co, Cr)

349-M. (Italian.) Researches on the Iron-Nitrogen System. A. Burdese. *Metallurgia italiana,* v. 47, no. 8, Aug. 1955, p. 357-361, 366.

Nitriding carried out in controlled atmosphere, Geiger-counting spectrometer used for some roentgenographic measures on solids. Graphs, tables, spectrograph. 16 ref. (M24, J28, Fe)

350-M. (Russian.) Microdeformations in the Crystal Lattice of Alpha-Iron in the Case of Quenched and Tempered Steel. B. Ia. Pines. *Doklady akademii nauk SSSR,* v. 103, no. 4, Aug. 1, 1955, p. 601-604.

Series of equations for values of epsilon and other phases. Table, graphs. 5 ref. (M26, Q24, ST)

351-M. (Russian.) Study of Limited Solid Solutions of Nickel by the X-Ray Structural Method. I. I. Kornilov and A. Ia. Snetkov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 7, July, p. 84-88.

Composition-parameter diagram of nickel alloys with aluminum, tungsten, chromium, or titanium, and of ternary systems of nickel with the same element; lattice parameters and the degree of distortion of the crystal lattice of nickel solid solutions. Tables, graphs. 12 ref. (M26, M24, Ni, Ti, W, Cr)

352-M. (Book.) Impurities and Imperfections. 231 p. 1955. American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio. $6.00.

Fundamentals of point, line, and surface imperfections. Effects of both impurities and imperfections on metallurgical reactions and on properties. Coverage is also given to semiconductors, ionic crystals, and radiation effects. (M general, N general)

353-M. (Book.) Reports of the European Congress of Applied Electron Microscopy, Ghent. Rapport Europees Congres toegepaste Electronenmicroscopie. G. Vandermeerssche. 359 p. 1954. Rijksuniversiteit, Rozier 6, Gent, Belgium.

Series of reports in the Western European languages and English devoted to industrial and medical applications of electron microscopy. (M21)

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Transformations and Resulting Structures

372-N. Ordering and Magnetic Heat Treatment of the 50 Pct Fe-50 Pct Co Alloy. R. C. Hall, G. P. Conard and J. F. Libsch. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 985-988.

Marked increase in ratio of residual to saturation induction can be explained on basis of decrease in 90° domain boundaries and by increase in anisotropy resulting from lattice distortion. Graphs. 42 ref. (N10, J21, Fe, Co)

373-N. Diffusion of Co^{60} and Fe^{55} in Cobalt. H. W. Mead and C. E. Birchenall. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 994-995.

Results for given temperature differ by a factor of six with no close agreement between any two sets of data. Table, graph. 8 ref. (N1, Co, Fe)

374-N. Grain Boundary Diffusion of Nickel Into Copper. S. Yukawa and M. J. Sinnott. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 996-1002.

Function of grain boundary angle and diffusion temperature. Activation energy for diffusion decreases with increasing angle. Micrographs, tables, graphs. 9 ref. (N1, Ni, Cu)

375-N. Bainite Reaction in a Plain Carbon Steel. H. I. Aaronson and C. Wells. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1002-1003.

Detailed metallographic investigation of the reaction in a hypoeutectoid steel. Micrographs. 10 ref. (N8, CN)

376-N. Diffusion of Zinc and Copper in Alpha and Beta Brasses. R. Resnick and R. W. Balluffi. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955. p. 1004-1010.

Determination of chemical diffusivity as function of composition and temperature. Graphs, tables, photographs, micrographs. 22 ref. (N1, Zn, Cu)

377-N. Contribution to Mathematics of Zone Melting. Leslie Burris, Jr., C. H. Stockman and I. G. Dillon. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1017-1023.

Equations predict concentration profiles after successive passes and give limiting distribution of solute along bar after an infinite number of passes. Diagram, graphs, table. 6 ref. (N12, C5)

378-N. Instability of a Smooth Solid-Liquid Interface During Solidification. D. Walton, W. A. Tiller, J. W. Rutter and W. C. Winegard. *Journal of Metals,* v. 7; *American Institute of*

Mining and Metallurgical Engineers, Transactions, v. 203, Sept. 1955, p. 1023-1026.

Cellular substructure observed in binary alloy crystals grown from melt of known concentration can be eliminated by proper choice of growth conditions. Graphs, micrographs, table. 9 ref. (N12)

379-N. Microcalorimetric Investigation of Recrystallization of Copper. Paul Gordon. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1043-1052.

Study of isothermal annealing of high-purity copper after room temperature tensile deformation. Diagrams, photograph, graphs, micrograph, tables. 19 ref. (N5, P12, Q24, J23, Cu)

380-N. Relationship Between Recovery and Recrystallization in Superpurity Aluminum. E. C. W. Perryman. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1053-1064.

Recrystallization results agree with Aurami's theory and indicate that perfect subgrains formed during recovery are not nuclei for recrystallization. Graphs, tables, micrographs. 30 ref. (N4, N5, Al)

381-N. Grain Boundaries, Substructures and Impurities. R. W. Cahn. Paper from "Impurities and Imperfections". American Society for Metals, p. 41-83.

Concentrates on interactions of impurities and boundaries as well as subboundaries. Diagrams, micrographs, graphs. 121 ref. (N1)

382-N. Effects of Impurities and Imperfections on Crystal Growth. Bruce Chalmers. Paper from "Impurities and Imperfections". American Society for Metals, p. 84-106.

Considers growth in absence and in presence of impurities, and growth from vapors and melt. Diagrams, micrographs, graphs. 24 ref. (N12, N15)

383-N. Role of Structural Impurities in Phase Transformations. David Turnbull. Paper from "Impurities and Imperfections". American Society for Metals, p. 121-144.

Reviews theory and interprets experience on various transformations. Diagrams, table, graph. 52 ref. (N general)

384-N. (English.) **Abnormal Grain Growth of Some Aluminum Alloys.** Thomas L. Fritzlen. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 237-245; disc., p. 245-246.

Results of an investigation to determine the growth characteristics of 99.5% aluminum sheet with small and large deformations at several annealing temperatures and times. Photographs, micrographs. 13 ref. (N3, Al)

385-N. (English.) **On the Theory of the Kirkendall Effect.** Frederick Seitz. Paper from "International Conference of Theoretical Physics, Proceedings". Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, p. 588-589; disc., p. 590-591.

Survey of evidence concerning the superconcentrations of vacancies that actually are achieved in metals. (N1)

386-N. (French.) **Role of Grain Boundaries and the $\alpha \rightarrow \gamma$ Allotropic Transformation of Iron in the Elimination of Pores During Sintering of Carbonyl Iron.** Georges Cizeron and Paul Lacombe. *Comptes rendus,* v. 241, no. 4, July 25, 1955, p. 409-411.

Investigation based on the hypothesis of self-diffusion mechanisms in volume and at the grain boundaries. Graph. 2 ref. (N1, N6, H15, Fe)

387-N. (French.) **Contribution to the Study of a Property of the Polygonized State of Iron.** Jean Montuelle. *Comptes rendus,* v. 241, no. 4, July 25, 1955, p. 411-412.

Study of recrystallization of polycrystalline and polygonized specimens of irons, of different purities, subjected to slight cold working. Micrograph. 1 ref. (N5, Fe)

388-N. (French.) **Evidence of the Polygonization of Aluminum by X-Rays and Micrography.** Christian de Beaulieu. *Comptes rendus,* v. 241, no. 4, July 25, 1955, p. 412-413.

Results of research and interpretation of Laue spots after high-temperature annealings. 4 ref. (N5, Al)

389-N. (French.) **Textural Phenomena Occurring During the Precipitation of Homogenized Aluminum-Zinc-Magnesium Alloys.** Paul Brenner and Margarete Schippers. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 219-228; disc., p. 228-229.

Preparation of specimens by continuous casting to study the micrographic structure after decomposition of the solid solution. Micrographs, graph. 11 ref. (N7, Al, Mg, Zn)

390-N. (French.) **Example of a Technical Application of the Critical Recrystallization of Aluminum.** H. Buckle. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 257-261.

Methods of treatment to produce the proper coarse grain in aluminum sheet used for decorative effects. Diagram, graph, micrographs. (N5, Al)

391-N. (French.) **Application of the Grain Coarsening Phenomena to the Making of Sheet With Decorative Designs.** Guy Salmon. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 263-269 + 1 plate; disc., p. 269.

Process for obtaining coarse grain of decorative effect with "under-refined" aluminum. Micrographs, photographs. 6 ref. (N3, Al)

392-N. (Hungarian.) **The Crystallization of Graphite in Cast Iron. I.** Istvan Karsay. *Öntöde,* v. 6, no. 8, Aug. 1955, p. 169-176.

Proposes new hypothesis for interpretation of all aspects of the crystallization process. Diagram, micrographs. (To be continued.) (N12, CI)

393-N. (Polish.) **Diffusion of Arsenic in Rail Steel.** Leonid Andrejew. *Wiadomosci hutnicze,* v. 11, no. 5, May 1955, p. 144-146.

Chemical composition of various melts; microstructure of steel in relation to arsenic content and after heat treatments. Tables, micrographs. 4 ref. (N1, M27, ST)

394-N. (Russian.) **Structural Diagram for Cast Iron Poured Over Into Metallic Molds.** N. P. Dubinin. *Liteinoe proizvodstvo,* 1955, no. 8, Aug., p. 15-16.

Rate of solidification of casting with and without stand core; structure of iron castings cooled with the mold; rate of solidification at different distances from the surfaces of the casting; effect of carbon, silicon or manganese contents on cooling and solidification. Graphs, diagrams. 7 ref. (N12, CI)

395-N. (Russian.) **Mechanism of the Effect of Quenching on Graphitization.** K. P. Bunin and E. N. Pogrebnoi. *Liteinoe proizvodstvo,* 1955, no. 8, Aug., p. 25-27.

Microstructure of steel after various periods of graphitization with and without preceding quenching in water; effect of length of previous austenitization of quenched steel on the number of graphite inclusions formed in the following tempering period. Micrographs, graph. 22 ref. (N8, ST)

396-N. (Russian.) **Influence of the Composition of Bearing Steels on the Carbide Network.** N. K. Ipatov, I. Ia. Aizenshtok and L. D. Kossovskii. *Stal',* v. 15, no. 8, Aug. 1955, p. 739-742.

Effect of variations in the carbon, chromium and manganese contents on the intergranular precipitation of carbide in tempered roll steel. Rate of cooling, tempering techniques and other heat treatment are not sufficient to eliminate or prevent sheating of the micrograin by carbides. Graphs. (N8, ST)

397-N. (Russian.) **Use of Radioactive Inductors to Measure the Diffusion Rate in Solid Bodies.** A. A. Zhukhovitskii. *Uspekhi khimii,* v. 24, no. 5, 1955, p. 575-583.

Importance in obtaining alloys with certain characteristics. Rate of recrystallization, phase transformations and other properties determined by diffusion. Table. 15 ref. (N1)

398-N. (Slovenian.) **The Diffusion Phenomena of Copper in Iron.** Matija Zumer and Franc Sirca. *Rudarsko-metalurski zbornik,* 1955, no. 1, p. 25-33.

Qualitative aspect of the diffusion of electrolytic copper in gamma and alpha iron at 1150, 1089 (epsilon phase), 1050 (both in solid state) and 750° C. (modification of alpha iron); difference between speed of intergranular and volume diffusion; frontal diffusion at temperatures above 1100° C.; effect of impurities. Micrographs, graphs, diagrams, photograph. 16 ref. (N1, Cu, Fe)

399-N. Austenitic Fe-Cr-C-N Stainless Steels. G. G. Tisinai, J. K. Stanley and C. H. Samans. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 7, 1955, 14 p.

Completely austenitic structures, without ferrite, carbides and nitrides, can be obtained in 21 to 33% chromium alloys by a proper combination of carbon and nitrogen. The austenite, produced by heating above 2000° F. and retained by rapid cooling, decomposes to ferrite, carbides and nitrides, below the stated austenitizing temperature. The martensite transformation is suppressed but can be obtained in alloys in certain ranges of composition. Tables, micrographs. 12 ref. (N8, M27, Q general, SS)

400-N. Inhibition by Nitrogen of Graphitization in Steel. G. V. Smith and B. W. Royle. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 17, 1955, 7 p.

Graphitization, during an arbitrary heat treatment known to promote it, was inhibited in eight heats of cold rolled, high carbon steel strip, by prior heating in an atmosphere of nitrogen for 6 hr. at 1900° F., which increased the nitrogen content from a level of about 0.005 to about 0.013%. Heating in hydrogen for 2 hr. at 1900° F., on the other hand, reduced the nitrogen content to about 0.003% and increased graphitization. Tables, micrographs. 4 ref. (N8, CN)

401-N. On Banding in Steel. C. F. Jatczak, D. J. Girardi and E. S. Rowland. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 20, 1955, 33 p.

Banding phenomenon studied in 1340, 2340, 4140, 4340, and 5140 type steels. Banding characteristics of these steels established by studying transformation behavior to ferrite and pearlite and to martensite on direct quenching and after a prior isothermal treatment at the upper nose of the TTT-curve. Tables, graphs, micrographs. 11 ref. (N8, M27, AY)

402-N. Nature and Decomposition Kinetics of Alpha Prime in Titanium-Vanadium Alloys. F. R. Brotzen, E. L. Harmon and A. R. Troiano. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 24, 1955, 11 p.

Nature and decomposition kinetics of martensitically transformed alpha titanium studied, utilizing X-ray diffraction techniques and electrical resistance and hardness measurements. Graphs. 5 ref. (N9, Ti)

403-N. Some Effects of Metal Removal and Heat Treatment on the Surfaces of Hardened Steels. Karl E. Beu and Donald P. Koistinen. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 28, 1955, 20 p.

Some effects of metal removal and heat treatment on surfaces of hardened steel, using retained austenite and residual stress measurements as a criterion. Graphs. 19 ref. (N8, L10, J general, ST)

404-N. Metallography of Tempering of Alpha-Prime in Titanium Alloys. R. F. Domagala and W. Rostoker. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 25, 1955, 11 p.

Program designed to discover, microscopically, how the alpha phase, a metastable supersaturated isomorph of the alpha phase changes on reheating to that of equilibrium alpha as dictated by the phase diagram. Micrographs. (N6, Ti)

405-N. The Rate of Diffusion of Carbon in Alpha and Beta Titanium. F. C. Wagner, E. J. Bucur and M. A. Steinberg. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 32, 1955, 24 p.

Diffusion rates of carbon in titanium determined over a range of temperature from 736 to 1150° C., excluding the two-phase region occurring between 822 to 920° C. Tables, diagrams, graphs, photograph, micrographs. 10 ref. (N1, Ti)

406-N. Self-Diffusion in Lead. Norman H. Nachtrieb and George S. Handler. *Journal of Chemical Physics,* v. 23, Sept. 1955, p. 1569-1570.

Measured over range of 174 to 322° C. by means of metallic radium deuteride. Table, graphs. 7 ref. (N1, Pb)

407-N (French.) **Apparatus for the Quantitative Determination in Polycristalline Materials.** M. Poganelli and G. Bedeschi. *Alluminio,* v. 24, no. 4, July-Aug. 1955, p. 329-334.

Prepared specimens may be examined by reflection with an X-ray spectrograph. An integrating device makes possible the observation of specimens taken from recrystallized materials or those that underwent a limited deformation. Photographs, diagrams, graphs, micrograph. 10 ref. (N5)

408-N. (German.) **Multi-Crystal Macrohardness of the Quenching Structure of Unalloyed Steel, and the Single Crystal Microhardness of Martensite.** Roland Mitsche and Karl L. Maurer. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 563-565.

Measurement of ten steels, with a carbon content ranging from 0.65 to 1.31%, after different thermal treatments. Tables, graphs. 5 ref. (N8, Q28, ST)

409-N. (German.) **The Effect of Boron and Aluminum Additions on the Graphite Formation of White-Heart Malleable Iron Castings.** Ulrich Klein and Karl Roesch. *Giesserei,* v. 42, no. 19, Sept. 15, 1955, p. 507-515.

Discussion of investigation and results shown in existing literature. Graphs, tables, diagram, micrographs. 9 ref. (N8, CI)

410-N. (German.) **Production of Germanium Single Crystals for Diodes and Transistors.** E. Schöne. *Nachrichtentechnik,* v. 5, no. 8, Aug. 1955, p. 373-374.

Methods for germanium purification and production of material for diodes and transistors. Photographs, micrographs, graphs. (N12, M26, Ge)

411-N. (Russian.) **Theory of Phase Transformations in Steel During Heating.** A. P. Guliaev and V. M. Zalkin. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 7, July, p. 93-95.

Transformation kinetics of pearlite into austenite with continuous heating, effect of rate of heating. Graphs. 3 ref. (N8, ST)

412-N. (Book.) **Nucleation-and-Growth Processes in Metals and Alloys.** H. K. Hardy and T. J. Heal. 46 p. 1955. Institute of Metals, 4 Grosvenor Gardens, London, England.

Examples of thermodynamic and composition relationships show that initial reaction may always be treated as part of precipitation process. (N2, N3, Pt, Co, Cu, Al)

P

Physical Properties and Test Methods

379-P. The Néel Theory of Ferrimagnetism. J. Samuel Smart. *American Journal of Physics,* v. 23, Sept. 1955, p. 356-370.

Molecular-field theory of magnetic ordering in systems which contain nonequivalent substructures of magnetic ions. Graphs, diagrams. 36 ref. (P16)

380-P. A Differential Dilatometer for Rapid Determination of Thermal Expansion Coefficients Near Room Temperature. R. M. Mayfield. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5221, July 1953, 17 p.

Design, calibration, operation, results and limitations of a mechanical type dilatometer. The precision and accuracy are such that changes of expansion characteristics with metallurgical treatment may be easily analyzed. Tables, graphs, photographs. 4 ref. (P11)

381-P. Domain Structures Suggest Key to Enigma of Magnetic Force. C. D. Graham, Jr. *Journal of Metals,* v. 7, Sept. 1955, p. 948-951.

Knowledge of effects of metallurgical structure on domain behavior should make it possible to predict structure required to produce magnetic properties needed for particular application. Micrographs, diagrams. 5 ref. (P16, Fe)

382-P. Thermodynamic Properties of the Alkali Metals. William H. Evans, Rosemary Jacobson, Thomas R. Munson and Donald D. Wagman. *Journal of Research, National Bureau of Standards,* v. 55, Aug. 1955, p. 83-96.

Tabular data for values of free-energy and heat-content functions, entropy, heat content and capacity, heat of formation, free energy of formation and logarithm of equilibrium constant of formation. Tables. 98 ref. (P12, Cs, Rb, K, Na, Li)

383-P. Hall Effect in Permalloys. Simon Foner. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1079-1081.

Measurements of 25 and 55% iron in nickel are compared with recent results for some cobalt-nickel and iron-nickel alloys. Graphs. 10 ref. (P15, Ni, Fe, Co)

384-P. Thermal Conductivity of Germanium at Ambient Temperatures. Kathryn A. McCarthy and Stanley S. Ballard. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p.1104.

Conductivity of high-purity germanium was measured from 5 to 95° C., employing a technique developed for small samples of poorly conducting materials. Graph. 5 ref. (P11, Ge)

385-P. Electron-Phonon Interaction in Metals. John Bardeen and David Pines. *Physical Review,* v. 99, ser. 2, Aug, 15, 1955, p. 1140-1150.

Role of electron-electron interactions investigated by extending Bohm-Pines collective description to account for ionic motion. 19 ref. (P15)

386-P. Intrinsic Optical Absorption in Single-Crystal Germanium and Silicon at 77°K and 300°K. W. C. Dash and R. Newman. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1151-1155.

Threshold for indirect and direct transitions of both metal types. Graphs. 10 ref. (P17, Ge, Si)

387-P. Surface Barrier Analysis for Metals by Means of Schottky Deviations. D. W. Juenker. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1155-1160.

Transmission coefficient for mirror-image barrier is applied to photoelectric emission. Graphs. 7 ref. (P15)

388-P. Pressure Dependence of de Haas-van Alphen Parameters in Bismuth. W. C. Overton, Jr., and Ted G. Berlincourt. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1165-1169.

Hall coefficient of single crystal has been measured at 4.2°K., in magnetic fields up to 12 kg. and under liquid helium pressures up to 120 atmos. Graphs, diagrams, table. 20 ref. (P15, Bi)

389-P. Properties of Grain Boundaries in Gold-Doped Germanium. A. G. Tweet. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1182-1189.

Below 100° K., these boundaries produce a path of relatively low electrical resistance. New permanent magnet for measuring Hall effect in semiconductors at low temperatures. Diagrams, graphs. 16 ref. (P15, Ge, Au)

390-P. Gyromagnetic Ratio of Iron at Low Magnetic Intensities. G. G. Scott. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1241-1244.

Measured value for the ratio of pure iron, as determined by a direct magneto-mechanical method, undergoes a change for low values of the induced magnetic intensities. Tables, graph. 4 ref. (P16, Fe)

391-P. Electrical Properties of Plastically Deformed Germanium. A. G. Tweet. *Physical Review,* v. 99, ser. 2, Aug. 15, 1955, p. 1245-1248.

Study of antimony- and gold-doped germanium, deformed at 550 to 620° C., show production of acceptor centers. Graphs. 14 ref. (P15, Q24, Ge)

392-P. Ferromagnetic Hall Coefficient of Nickel Alloys. Albert I. Schindler and Edward I. Salkovitz. *Physical Review*, v. 99, ser. 2, Aug. 15, 1955, p. 1251-1252.

Karplus-Luttinger theory indicates that coefficient is related to square of electrical resistivity. Table, graph. 9 ref. (P16, Ni)

393-P. The Phase Transition in Superconductors. IV. Aluminium. T. E. Faber. *Royal Society, Proceedings*, v. 231, ser. A, Sept. 6, 1955, p. 353-367.

Extends the comparison between the behavior of superconducting aluminum and tin, at high frequencies, to the surface tension which acts on any boundary dividing the superconducting from the normal phase. Graphs, table, diagram. 14 ref. (P10, P15, Al)

394-P. The Penetration Depth and High-Frequency Resistance of Superconducting Aluminium. T. E. Faber and A. B. Pippard. *Royal Society, Proceedings*, v. 231; ser. A, Sept. 6, 1955, p. 336-353.

Measurements of the surface resistance and reactance, at a frequency of 1200 Mc. per sec., indicates it may be highly anisotropic. Its average value at 0° K. may be taken to be 4.9×10^{-6} cm., which is close to the value found for tin. Graphs. 24 ref. (P15, Al)

395-P. The Physical Properties of Sintered Zirconium. Herbert S. Kalish, Henry H. Hausner and Roswell P. Angler. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission)*, SEP-44, Mar. 1951, 32 p.

It is shown that zirconium is suitable for powder metallurgical application and that zirconium hydride powder, in fabrication techniques, has advantages over zirconium powder. Tables, graphs, micrographs. 15 ref. (P general, H general, Zr)

396-P. Influence of Impurities and Imperfections on the Electrical Properties of Metals. J. S. Koehler. Paper from "Impurities and Imperfections". American Society for Metals, p. 162-169.

Considers point imperfections, influence of dislocations and stacking faults, and effects of grain boundaries and precipitates. Table. 22 ref. (P15, M26)

397-P. Effects of Impurities and Imperfections in Semiconductors. J. A. Burton. Paper from "Impurities and Imperfections". American Society for Metals, p. 186-199.

Important semiconductor properties for transistor applications and how these properties are influenced by chemical impurities and imperfections. Diagrams, tables, graphs. 59 ref. (P15, M26, Ge, Si)

398-P. (English.) **Diamagnetism in Metals.** Lars Onsager. Paper from "International Conference of Theoretical Physics, Proceedings". Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, p. 669-675; disc., p. 676.

Various theories to explain observed phenomena. Graphs. 20 ref. (P16)

399-P. (English.) **On Diamagnetism of Metals.** Rudolf E. Peierls. Paper from "International Conference of Theoretical Physics, Proceedings." Organizing International Conference Committee of Theoretical Physics, Science Council of Japan, p. 676-677; disc., p. 678.

Theoretical solution of a wave equation gives greater conformity with observed data than use of quantum theory. 2 ref. (P16)

400-P. (English.) **Problem of Ferromagnetism.** John C. Slater. Paper from "International Conference of Theoretical Physics, Proceedings". Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, p. 679-691; disc., p. 691-693.

Explains ferromagnetism on the basis of the energy band functions or molecular orbitals. Graph. (P16)

401-P. (French.) **Study of Thermoelectric Properties of Aluminum in Very Thin Lamellae.** Jean-Jacques Savornin and France Savornin. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 339-340.

Measurements are made on thin lamellae of super purity aluminum coupled to copper. Diagram, graph, table. (P15, Al, Cu)

402-P. (German.) **On the Causes of Permeability Changes Due to Cooling of Magnetic Field in Iron-Silicon Monocrystals.** H. Fahlenbrach. *Technische Mitteilungen Krupp*, v. 13, no. 4, Aug. 1955 p. 84-95.

Measurement of virgin magnetization curves on iron-silicon alloys of different metallograpihc orientation with and without magnetic-field cooling; observation of elementary-range structure by Bitter-William's strip method. Graphs, micrographs. 16 ref. (P16, Fe, Si)

403-P. (German.) **Precision Measurements for the Heat of Fusion of Certain Metals.** Willy Oelsen, Olaf Oelsen and Dieter Thiel. *Zeitschrift für Metallkunde*, v. 46, no. 8, Aug. 1955, p. 555-560.

Evaluation of the method for indium, thallium, tin, cadmium, lead, zinc, aluminum and antimony; heat of transformation of thallium. Graph, diagram, tables. 15 ref. (P12, In, Tl, Sn, Cd, Pb, Zn, Al, Sb)

404-P. Total Normal Emissivity Measurements on Aircraft Materials Between 100 and 800° F. N. W. Snyder, J. T. Gier and R. V. Dunkle. *ASME, Transactions*, v. 77, Oct. 1955, p. 1011-1019.

Test methods and results. Data presented are useful aids as a phase of the technique of evaluation of equilibrium temperatures of different surfaces exposed to solar irradiation. Diagrams, graphs, table. 7 ref. (P17)

405-P. Thermal Conductivity and Its Variability With Temperature and Pressure. L. S. Kowalczyk. *ASME, Transactions*, v. 77, Oct. 1955, p. 1021-1035.

Present status of theory of thermal conductivity, its variability with temperature and pressure explained by means of nature of heat, structure of matter and resistances offered by matter to heat conduction at various physical states. Tables, diagram, graphs. 52 ref. (P11)

406-P. Effect of Fluorides and Other Addition Agents on the Cathodic Potential of Titanium in Hydrofluoric Acid. M. E. Straumanis, S. T. Shih and W. W. Schlechten. *Electrochemical Society, Journal*, v. 102, Oct. 1955, p. 573-576.

Absolute hydrogen overvoltage values increase or cathodic potentials decrease when alkali fluorides and organic colloid solutions of agar-agar or arabic gum are added; methylene blue increases potentials. Graphs. 16 ref. (P15, Ti)

407-P. Electrokinetic Potentials of Bulk Metals by Streaming Current Measurements. I. Method. Ray M. Hurd and Norman Hackerman. *Electrochemical Society, Journal*, v. 102, Oct. 1955, p. 594-597.

Experimental data prove validity of measuring currents developed by fluid flow through metal capillaries. Graphs, diagrams. 4 ref. (To be continued.) (P15)

408-P. Liquid Metal Heat Transfer. W. B. Hall. *International Conference on the Peaceful Uses of Atomic Energy*, A/CONF.8/P/417, June 1955, 16 p.

Considers fluids with low Prandtl number. Shows significant variations in temperature around annuli carrying liquid metal in heat exchanger. Diagrams, graphs. 6 ref. (P11)

409-P. Effect of Nitrides on the Coercive Force of Iron. J. Kerr and C. Wert. *Journal of Applied Physics*, v. 26, Sept. 1955, p. 1147-1151.

Results are in agreement with those reported for effect of carbides. Graphs, micrographs. 10 ref. (P16, Fe)

410-P. Thermal Expansion and Phase Transformations of Low-Expanding Cobalt-Iron-Chromium Alloys. Peter Hidnert and Richard K. Kirby. *Journal of Research, National Bureau of Standards*, v. 55, July 1955, p. 29-37.

Study between −65 and +800° C. covers effects due to temperature, chemical composition and heat treatment. Tables, graphs, micrographs. 10 ref. (P11, N6, Co, Fe, Cr)

411-P. The Infra-Red Properties of Some Metallic Films. J. N. Hodgson. *Physical Society, Proceedings*, v. 68, no. 429B, Sept. 1955, p. 593-602.

Measured for evaporated films of gold, silver, copper, zinc, tin and aluminum. Graphs. 15 ref. (P17, Au, Ag, Cu, Zn, Sn, Al)

412-P. The Direct Separation of the Reversible and Irreversible Components of the Magnetothermal Effect. L. F. Bates and N. P. R. Sherry. *Physical Society, Proceedings*, v. 68, no. 429B, Sept. 1955, p. 642-648.

Method carries out small backward increments in magnetization at given points on hysteresis cycle. Graphs. 8 ref. (P16, Co)

413-P. Application of Chemical Thermodynamics to the Study of Alloy Formation. W. E. Wallace, R. S. Craig, W. V. Johnston, G. S. Kamath, K. F. Sterrett, T. R. Waite and M. G. Zabetakis. *University of Pittsburgh, (U. S. Atomic Energy Commission)*, NYO-6327, July 1955, 5 p.

With the aid of recent heat capacity measurements on $MgCd_3$ and Mg_3Cd the heats, entropies and free energies for formation of these alloys at 25° C. were computed. Thermal conductivities of $MgCd_3$, MgCd and Mg_3Cd from 80 to 300° K. determined. Table. 3 ref. (P12, Mg, Cd)

414-P. (French.) **Magnetic Susceptibilities of the Gallium Crystal and Liquid Gallium.** André Marchand. *Comptes rendus*, v. 241, no. 5, Aug. 1, 1955, p. 468-470.

Determination of the principal susceptibilities of the gallium crystal between 80 and 290° K., and liquid gallium at 40° C. Graph, table. 6 ref. (P16, Ga)

415-P. (French.) **Ferromagnetic Resonance of Gadolinium Ferrites as a Function of Temperature, at 9000 Mc. per Sec.** Jean Paulevé. *Comptes rendus*, v. 241, no. 6, Aug. 8, 1955, p. 548-550.

Study of phenomena of ferromagnetic resonance of ferrite in a range of temperatures around 306° K. Graphs. 5 ref. (P16, Gd, Fe)

416-P. (French.) **Properties of the Boron-Aluminum Semiconductor Compounds.** J. Lagrenaudie. *Journal de chimie physique,* v. 52, no. 1, Jan. 1955, p. 34-37 + 1 plate.

High-temperature resistance and low-temperature conductance of AlB_{12}. Current-voltage characteristics and photoelectric effects of Wöhler's aluminum-boron carbides. Micrograph, graphs. 10 ref. (P15, B, Al)

417-P. (German.) **Thermodynamic Analysis. III. Automatic Indication of Enthalpy Curves of Metals and Alloys.** Willy Oelsen. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 519-522.

Method of recording enthalpy of metals and alloys from colorimetric measurement, with examples for indium, tin, bismuth, thallium, cadmium and lead. Graphs, photographs, table. 6 ref. (P12, In, Sn, Bi, Ti, Cd, Pb)

418-P. (German.) **Dependence of Magnetic Reversal Losses of Hot Rolled Transformer Sheets on the Annealing Condition.** Franz Lihl and Paul Zemsch. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 535-540.

Results of investigation of the magnetic reversal losses in a 0.4-mm. thick sheet with 4.3% silicon, and 0.25% aluminum content, also presence of nonmetallic inclusion in the tested metal sheet at temperatures from 800 to 1200° C. Tables, micrographs, graphs. (P16, J23, AY)

419-P. (German.) **Measuring the Magnetic Permeability of Metals by Means of Hollow Resonator and the Permeability of Iron in the Region of Ferromagnetic Resonance.** K. Helmut Reich. *Frequenz,* v. 9, no. 9, Sept. 1955, p. 299-305.

Cause of dependence of magnetic permeability on frequency; method and operating instructions; discussion of obtained data from practical and theoretical viewpoints. Graphs. 4 ref. (To be continued.) (P16, Fe)

420-P. (German.) **Practical Limitations in Electrical Measurements Caused by Metallic Material. II. Influence of Metallic Materials on Measurement Inaccuracy.** R. Ennulat. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 758-763.

Influence of properties of metals used in electrical measuring instruments on the accuracy of the instruments. Tables, photographs, diagram, graphs. 8 ref. (P15, P16, T8)

421-P. (German.) **New Experimental Results in the Field of Superconductivity.** Werner Buckel. *Naturwissenschaften,* v. 42, no. 16, Aug. 1955, p. 451-458.

Superconducting components produced from non-superconducting metallic elements giving their transition temperature, the change of physical properties under superconductivity, the isotopic effect and the influence of pressure and lattice distortion on the characteristic superconducting properties. Micrographs, graphs, table. 125 ref. (P15)

422-P. (German.) **Superconduction and the Electrical Resistance of Condensed Bismuth Layers.** Nikolaus Barth. *Zeitschrift für Physik,* v. 142, no. 1, 1955, p. 58-69.

Investigation in which stabilization of bismuth superconductivity, by introducing different inclusion, has been successfully carried out up to 200° K. Graphs. 20 ref. (P15, Bi)

423-P. (Russian.) **Paramagnetic Properties of Austenitic Alloys With Varying Chromium Content.** V. I. Proskvirin and S. Ia. Sigolaev. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 7, July, p. 96-100.

Chemical composition of specimens used. Equipment and determination of magnetic susceptibility, influence of quenching temperature, hysteresis of magnetic susceptibility of austenite. Table, graphs. 1 ref. (P16, AY)

424-P. (Russian.) **Theory of Electrical Conductivity of Metals.** P. S. Zyrianov. *Zhurnal eksperimental'noi i teoreticheskoi fiziki,* v. 29, no. 2, Aug. 1955, p. 193-200.

Calculating the fluctuations of the potential within an electrical field in an electronic-ionic plasma of the metal and the electrical resistance brought about by the scattering of electrons. 13 ref. (P15)

425-P. (Book—English.) **International Conference of Theoretical Physics,** *Proceedings.* 942 p. 1954. Organizing Committee, International Conference of Theoretical Physics, Science Council of Japan, Ueno Park, Tokyo, Japan.

Reports on field theory, elementary particles, nuclear physics, statistical mechanics, crystal dislocations, and physical properties of metals. (P general, M26)

Q

Mechanical Properties and Test Methods; Deformation

937-Q. Physical Characteristics of Titanium Carbide Type Cermets at Elevated Temperatures. F. P. Knudsen, R. E. Moreland and R. F. Geller. *American Ceramic Society, Journal,* v. 38, Sept. 1955, p. 312-323.

Shows creep behavior and strength at 1200 to 1850° F. for cermets to be used in the high-temperature areas of aircraft. Cermet K162B was superior. Diagrams, tables, photographs, micrographs, graphs. 10 ref. (Q3, Q4, C-n)

938-Q. Stress Analysis Takes Guesswork Out of Product Performance. W. G. Patton. *Iron Age,* v. 176, Sept. 15, 1955, p. 131-134.

Stress analysis is being used by Ford Tractor Div. to help improve farm implement design. Photographs, graph. (Q25, ST)

939-Q. The Elastic-Plastic Stress Distribution Within a Wide Curved Bar Subjected to Pure Bending. Bernard W. Shaffer and Raymond N. House, Jr. *Journal of Applied Mechanics,* v. 22, Sept. 1955, p. 305-310.

Analytical expressions obtained for radial and circumferential stress. Elastic stress distributions are based on Airy stress functions, whereas those for plastic are based on the Tresca yield condition. Graphs. (Q22, Q23, Q5)

940-Q. Thermal Stresses in Rectangular Strips. II. J. S. Born and G. Horvay. *Journal of Applied Mechanics,* v. 22, Sept. 1955, p. 401-406.

Stresses and deformations due to various longitudinal temperature distributions are presented, the results of which are important to slabs, plate assemblies, rectangular ducts, tube-sheet ligaments and cylindrical bodies. Diagrams, tables, graphs. 2 ref. (Q25)

941-Q. Combined Tension-Torsion Tests With Fixed Principal Directions. E. A. Davis. *Journal of Applied Mechanics,* v. 22, Sept. 1955, p. 411-415.

Octahedral shearing-stress versus octahedral shearing-strain diagrams for four specimens coincide quite closely. Photographs, graphs, table. 7 ref. (Q27)

942-Q. The Statistical Theory of Size and Shape Effects in Fatigue. F. A. McClintock. *Journal of Applied Mechanics,* v. 22, Sept. 1955, p. 421-426.

Stress amplitude is constant with respect to time but falls off parabolically along length of specimen from point of maximum stress. Graphs, diagrams. 7 ref. (Q7)

943-Q. Further Observations on Yield in Single Crystals of Iron. H. W. Paxton and I. J. Bear. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 989-994.

Yield in two stages of which the second corresponds closely to Lüders extension in polycrystalline iron. Graphs, tables, diagrams, photographs. 20 ref. (Q23, Fe)

944-Q. Bauschinger Effect in Creep and Tensile Tests on Copper. J. D. Lubahn. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1031-1033.

This rounding of corner of stress-strain curve upon reloading represents temporary softness that is more pronounced at large strains than small and for complete unloading than for partial unloading. Graphs. 4 ref. (Q24, Q3, Cu)

945-Q. The Selection of Sheet Steel for Formability. *Metal Progress,* v. 68, Aug. 15, 1955, p. 1-11.

Selection of cold and hot rolled low-carbon steels. Mechanical properties correlated from viewpoint of the measurable formability required to make parts of specific forming severity. Surface finish, directionality, grain size and aging, and processing effects are considered with respect to their effect on formability. Tables, photographs, graphs. (Q23, G4, ST)

946-Q. Recent Developments in Chromium Diffusion. II. Influence on Properties of Steel. R. L. Samuel, N. A. Lockington and H. Dorner. *Metal Treatment and Drop Forging,* v. 22, July 1955, p. 288-292, 287.

Effects on hardness, ductility, tensile and other mechanical properties. Tables, graph, photograph, micrographs. (To be continued.) (Q23, Q27, Q29, N1, ST)

947-Q. Investigation on the Strength of Redux Bonded 75S-T6 Clad Simple Lap Joints and of 24S-T Lugs at Rapidly Applied Loads. J. P. Benthem and G. de Vries. *Netherlands National Luchtvaartlaboratorium Report* S.466, June 1955, 5 p. + 12 plates.

Neither drop nor increase in strength of either joints or lugs could be detected. Diagrams, graphs, photographs. (Q23, K12, Al)

948-Q. The Bending Fatigue Strength of Aluminium Alloy MG_5 Between 10 and 10 Million Cycles. A. C. Low. *Royal Aeronautical Society, Journal,* v. 59, July 1955, p. 502-506.

Test results do not conform with predictions of cumulative damage theory. Photographs, tables, graphs, diagram. (Q7, Q5, Al)

949-Q. A Method for Tensile Testing of Radioactive Materials. C. A. Bruch. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 277-286.

Two separable strain gages are used in succession to obtain recordings of the load-elongation curve.

The first gage provides high magnification of the low strain region, the second gives low magnification of the subsequent strain to fracture. Diagrams, photographs, graphs. (Q27)

950-Q. Effects of Impurities and Imperfections on Mechanical Properties. Earl R. Parker and Jack Washburn. Paper from "Impurities and Imperfections". American Society for Metals, p. 145-161.

Experiments were undertaken to better understand yield, work hardening and creep; and to apply knowledge to improve commercial material. Graphs, diagrams. 14 ref. (Q general, M26)

951-Q. Structure Dependent Chemistry of Metal Surfaces. W. D. Robertson. Paper from "Impurities and Imperfections". American Society for Metals, p. 170-185.

Considers imperfections associated with growth history and described by differences between adjacent crystals and imperfections resulting from plastic deformation. Graphs, micrographs. 15 ref. (Q24, M26)

952-Q. Control and Programming of a 200,000-Pound Fatigue Machine. H. C. Roberts and V. J. McDonald. *Proceedings,* Society for Experimental Stress Analysis, v. II, No. 2, p. 1-10.

System is applied to lever-type machines because of their ruggedness and simplicity. Three types of programming devices have been applied but many more hold promise. Diagrams, photographs. 4 ref. (Q7)

953-Q. Simplified Measurement of Residual Stresses. J. L. Waisman and A. Phillips. *Proceedings,* Society for Experimental Stress Analysis, v. II, No. 2, p. 29-44.

Technique for measuring the residual stress gradient developed in plates involves the removal, by chemical solution, of layers from one surface of a specimen containing residual stresses and the simultaneous measurement of curvature changes accompanying the removals. Measuring fixture is described. Diagrams, graphs, photograph. (Q25)

954-Q. Network Representation of Elastic Problems in Cylindrical Coordinates. W. A. Gross and W. W. Soroka. *Proceedings,* Society for Experimental Stress Analysis, v. II, No. 2, p. 45-58.

Relations between the electrical circuit and the corresponding lumped elastic system of a three-dimensional problem in cylindrical coordinates shown in detail. The difficulty of simulating boundary stresses besetting previous developments has been resolved. Diagrams, tables. 8 ref. (Q21)

955-Q. Experimental Stress Determination Within a Metal During Plastic Flow. E. G. Thomsen and J. T. Lapsley, Jr. *Proceedings,* Society for Experimental Stress Analysis, v. II, No. 2, p. 59-68.

An experimental strain analysis for a non-work hardening metal from a stepwise deformation process. The stress distribution may be calculated for the case where the load at a particular section of the metal is known and for the more general case where only the hydrostatic tension is known at one point in the metal. Photograph, diagrams, graphs. 2 ref. (Q23, Q25)

956-Q. Improved Brittle Coatings for Use Under Widely Varying Temperature Conditions. F. N. Singdale. Paper from *Proceedings,* Society for Experimental Stress Analysis, v. II, No. 2, p. 173-178.

Oil and water resistant vitreous enamels for stress analysis in steel are sensitive to stresses from 4000 to 50,000 psi. Enamels for aluminum are being developed. Photographs. (Q25, Al, ST)

957-Q. Stress Concentration Factors For a Single Notch in a Flat Bar in Pure and Central Bending. M. M. Leven and M. M. Frocht. *Proceedings,* Society for Experimental Stress Analysis, v. 11, No. 2, p. 179-184.

Investigated photo-elastically for flat bars. The maximum stress in the bars with the single notch is about 15% higher than that in the bar containing two notches, for equal parameters and similar loading. Graphs, photographs. 6 ref. (Q25)

958-Q. Relation Between Stress Analysis and Fatigue of Metals. R. E. Peterson. *Proceedings,* Society for Experimental Stress Analysis, v. 11, No. 2, p. 199-206.

Stress distribution in metal parts has great influence on fatigue performance. Photographs, graphs. 11 ref. (Q7, Q25)

959-Q. Interpretation of Creep and Long-Time Test Data. J. Martin. *Proceedings,* Society for Experimental Stress Analysis, v. 11, No. 2, p. 207-212.

Application of creep behavior studies. Graphs, tables. 8 ref. (Q3)

960-Q. Transformation and Precipitation Processes in Austenitic Chromium-Nickel Steels at Elevated Temperatures. E. Baerlecken and W. Hirsch. *Henry Brutcher Translation No.* 3453, 28 p. (From *Stahl und Eisen,* v. 75, no. 9, 1955, p. 570-579.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 602-Q, 1955. (Q general, R5, SS)

961-Q. Effect of Cracks Upon the Mechanical Properties of Metals in Different States of Stress. Ya. B. Fridman, T. K. Zilova and N. I. Zhukova. *Henry Brutcher Translation No.* 3542, 5 p. (From *Doklady Akademii Nauk SSSR,* v. 84, no. 1, 1952, p. 67-70.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 727-Q, 1952. (Q25)

962-Q. (English.) **Tests on Steel Pylons for Overhead Power Lines.** P. Fayoux. *Acier, Stahl, Steel,* v. 20, nos. 7-8, July-Aug. 1955, p. 291-298.

Compares influence of shape and arrangement of lattice framework to determine influence of wind bracing and to check failure loads for a large number of pylons. Diagrams, photographs. (Q23, T1, ST)

963-Q. (English.) **The Creep Properties of Aluminium Alloys With Reference to Future Uses of Aluminium at Elevated Temperatures.** David E. Thomas. Paper from "Congres International de l'Aluminum". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 275-281.

Review of the existing information about creep properties; discusses to what extent this information is likely to be adequate to meet the demands which might be made in connection with future trends in applications involving the use of aluminum alloys at elevated temperatures. Graphs, tables. 18 ref. (Q3, Al)

964-Q. (Czech.) **Stability of Long Plates Under Shear Stress.** V. Placak. *Strojirenstvi,* v. 5, no. 5, May 1955, p. 325-329.

Existing methods of calculating the properties of various test structures for stages of deformation, stressed states and buckling or warping. State of the bar, equilibrium conditions, critical stresses and size of load. Photographs, diagrams. (Q2, Q25, ST)

965-Q. (French.) **Installation for Testing Hot Fatigue in Wave Thrust in Petroleum Combustion Gases.** G. Vidal. *Recherche Aéronautique,* 1955, no. 46, July-Aug., p. 25-29.

Apparatus for hot fatigue tests for reducing, oxidizing and alternating reducing and oxidizing types of combustion, and for impurities dissolved in petroleum, in any controlled atmosphere at normal atmospheric pressure. Diagrams, micrographs, photographs, table. 5 ref. (Q7)

966-Q. (French.) **Contribution to the Study of the Ductility and Toughness of Gray Cast Irons.** Albert Collaud. *von Roll Mitteilungen,* v. 13, nos. 3-4, July-Dec. 1954, p. 25-74.

Tests carried out with machined specimens require distinctly different treatment and formulas for accurate evaluation. Ductility and Brinell hardness are related. Tables, graphs, micrographs. (Q23, Q29, CI)

967-Q. (French.) **Study of the Quenching of a Light Alloy With Reference to Its Elastic Properties.** Robert Cabarat. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 271-273; disc., p. 273.

Method of measuring the modulus of elasticity and internal friction. In an application of this method, the author shows the effects of quenching—against time—on an aluminum-zinc alloy, with reference to its elastic properties. Diagram, graph, photograph. (Q21, Q22, J26, Al, Zn)

968-Q. (French.) **Rolling and Recrystallization Textures of Aluminum Plates.** Wolfgang Bunk. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 231-236.

Specimens of industrial hot rolled aluminum, subjected to different amounts of cold work and heat treatments examined with an X-ray goniometer; detailed description of the textures. Graphs. 8 ref. (Q24, Al)

969-Q. (German.) **Orientation of Crystal Structure in Galvanized Steel Wire After Drawing.** Wolfgang Gruhl and Irmgard Eisenhuth. *Stahl und Eisen,* v. 75, no. 17, Aug. 25, 1955, p. 1100-1101.

Determination of the preferred crystallographic orientation in the zinc coat of a galvanized and subsequently cold drawn steel wire. Graph, diagrams. 2 ref. (Q24, ST, Zn)

970-Q. (German.) **Creep Behavior of Pure and Low Alloyed Copper.** Hugo Vosskühler. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 525-534.

Evaluation of existing bibliographical data on time-elongation limit (time yield), creep rate limit and long-time creep resistance. Tables, graphs. 14 ref. (Q3, Cu)

971-Q. (German.) **Solubility of Oxygen in Tantalum and Related Changes in Tantalum Properties.** Erich Gebhardt and Hans Preisendanz. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 560-568.

Development of method at very high temperatures and very low pressures, to show the influence of oxygen on damping, nodulus of elasticity, magnetic susceptibility, hardness, tensile strength, elongation, necking, and chemical behavior of tantalum. Graphs, diagram, photograph. 37 ref. (Q general, P13, Ta)

972-Q. (German.) **Irreversible Elongation of Zinc Under Thermal Stress.**

Kurt Claus and Karl Löhberg. *Zeitschrift für Metallukunde*, v. 46, no. 8, Aug. 1955, p. 582-588.

Cnanges in elongation during liquation processes, recrystallization and grain growth; changes in coefficient of expansion, elasticity modulus, and structure due to thermal stress. Graphs, diagrams, micrographs. 9 ref. (Q23, Q25, N5, N3, Zn)

973-Q. (Russian.) **Theory of the Plastic Deformations of Metals.** N. S. Akulov and P. P. Galenko. *Doklady akademii nauk SSSR*, v. 103, no. 3, July 21, 1955, p. 387-390.

Equations for the movements in "blocks", accounting for the variation of dislocation in different portions of the crystal. Diagrams, graph. (Q24, M26)

974-Q. (Russian.) **Lithoidal Fracture in Construction Steels.** S. S. Nosyreva and A. M. Poliazova. *Doklady akademii nauk SSSR*, v. 103, no. 3, July 21, 1955, p. 431-432 + 1 plate.

Effect of amount and distribution of sulfides in forged or rolled steels after overheating and subsequent normal heat treatment. Micrographs. 3 ref. (Q26, ST)

975-Q. (Russian.) **Energy Theory of the Formation of Cracks in Cast Iron Ingot Molds.** S. F. Fomin. *Stal'* v. 15, no. 8, Aug. 1955, p. 743-747.

Theory that the influence of the individual chemical elements of cast iron on the development of cracks in molds depends on "amount of internal energy" of each element, which is characterized by its "thermochemical potential". Use of the energy theory calculations has resulted in molds lasting through twice as many pourings under actual casting conditions. Tables. 3 ref. (Q26, D9, T5, CI)

976-Q. (Russian.) **Method of Determining the Embrittlement of Steel in the Case of Blue Brittleness.** G. I. Pogodin-Alekseev. *Zavodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 971-974.

Variation in impact toughness or plasticity of steel in the range of cold shortness and blue brittleness determined by impact and static testing; relation of carbon content to strength. Graphs, tables. (Q23, ST)

977-Q. (Russian.) **Allowance for Deformation Rate When Tensile Testing Aluminum Alloy Sheets.** F. V. Tuliankin and B. D. Galatskii. *Zavodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 975-979.

Relation of critical rate of deformation to tensile strength for variously heat treated specimens of aluminum alloys, and of tensile strength and relative elongation to test rate. Graphs, tables. 5 ref. (Q27, Al)

978-Q. (Russian.) **New Machine for Fatigue Testing Thin Sheet Metal.** I. M. Roitman. *Zavodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 983-985.

Testing by pure bending; machine design and operation. Diagrams. (Q7, Q5)

979-Q. A Practical Method of Fatigue Stress Analysis. W. H. Burdon. *Aircraft Engineering*, v. 27, Sept. 1955, p. 299 + 6 p.

Linear relationship, existing between principal variants in material fatigue, leads to solution of analysis for light alloys under axial stresses. Theoretical notch factors used. Graphs, tables. 17 ref. (Q7, Q25)

980-Q. Influence of Alloying Elements on the Impact Transition Behavior of 12% Cr Steels Aged at 900° F. E. J. Whittenberger and E. R. Rosenow. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 1, 1955, 35 p.

Effect of varying amounts of carbon, chromium, molybdenum, aluminum and titanium upon the V-notch Charpy transition temperature of 12% chromium steels aged for 10,000 hr. at 900° F. Tables, graphs, micrographs. 5 ref. (Q6, Q23, AY)

981-Q. Creep Rupture Properties of Cold Worked Type 347 Stainless Steel. N. J. Grant, Albert G. Bucklin and Warren Rowland. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 2, 1955, 14 p.

Cold-worked up to 60%, the recrystallization temperatures were determined for 0.5, 5, and 50-hr. intervals. In addition to tensile testing at room temperature, creep rupture tests were performed at 1200, 1300 and 1500° F. to study the effects of cold work on the high-temperature properties, and to relate the time-temperature values for the incidence of intercrystalline fracture to the static recrystallization temperature. Tables, graphs, micrographs. 4 ref. (Q3, Q4, N5, SS)

982-Q. Notch Ductility of Type 410 (12% Cr) Stainless Steel. F. A. Brandt, H. F. Bishop and W. S. Pellini. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 3, 1955, 30 p.

Influence of composition and heat treatment variables on the notch ductility of cast stainless steels. Sharp crack tests of large specimens were used to establish the temperature range of transition from notch-ductile to notch-brittle behavior and correlation was established with results of conventional Charpy-V tests. Tables, graphs, diagrams, micrographs. 5 ref. (Q23, SS)

983-Q. The Influence of Stain Rate and Temperature on the Ductility of Austenitic Stainless Steel. G. W. Form and W. M. Baldwin, Jr. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 4, 1955, 14 p.

The ductility shows a maximum at room temperature at low strain rate, but at high strain rates it increases slowly and steadily with the test temperature. Magnetic measurements showed that the gamma-alpha transformation cannot account for all these behaviors. Diagrams, graphs, micrographs. 14 ref. (Q23, Q27, SS)

984-Q. The Effect of Composition and Structure on the Creep Rupture Properties of 18-8 Stainless Steels. Forest C. Monkman, Peter E. Price and Nicholas J. Grant. *American Society for Metals, Transactions*, v. 48, *Prevrint No.* 6, 1955, 34 p.

Twenty-seven simple unstabilized stainless steels were prepared in which amounts of chromium, nickel, and carbon plus nitrogen were varied. Stress-rupture tests were conducted on these alloys at temperatures of 1000, 1200 and 1300° F. for rupture lives of about 30 sec. to 500 hr. Tables, graphs, micrographs. 9 ref. (Q3, Q4, SS)

985-Q. Some Effects of Silicon on the Mechanical Properties of High Strength Steels. C. H. Shih, B. L. Averbach and Morris Cohen. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 9, 1955, 33 p.

Effects of increasing silicon content in 4340 and 4325 steels to 1.5% observed as a function of tempering temperature. The softening on tempering is retarded by silicon and it appears possible to obtain somewhat higher strengths in the silicon steels without a corresponding loss in ductility or in Charpy impact strength. Tables, graphs, micrographs. 12 ref. (Q general, AY)

986-Q. Some Relationships Between Endurance Limit and Torsional Properties of Steel. S. T. Ross, R. P. Sernka and W. E. Jominy. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 10, 1955, 26 p.

Comparison of fatigue and torsion test results shows that the maximum endurance limit of tempered low alloy steels can be approximated from torsional yield strength-hardness data. The torsion yield strength-hardness relation is linear until a region of high hardness is reached where this relation ceases and a condition of instability occurs. Tables, graphs, micrographs. 14 ref. (Q1, Q7, AY)

987-Q. The Influence of Molybdenum and Tungsten on Temper Embrittlement. A. E. Powers. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 11, 1955, 19 p.

Influence of molybdenum and tungsten, up to 2%, on the susceptibility of a 1% Cr, 1% Mn steel. Steels were aged for 1000 hr. at various temperatures within the temper embrittling region and the susceptibility to embrittlement measured from the rise in the transition temperature. Tables, graphs. 21 ref. (Q23, AY)

988-Q. Hardness of Tempered Martensite in Carbon and Low Alloy Steels. R. A. Grange and R. W. Baughman. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 12, 1955, 24 p.

Hardness of martensite in a number of plain carbon and alloy steels, after tempering, for various combinations of temperature and time is presented and data compared to reveal the effect of carbon and alloying elements. An empirical method for estimating, within limits, from chemical composition the hardness of tempered martensite developed from these data. Graphs, tables. 11 ref. (Q29, ST)

989-Q. Deformation of Beryllium Single Crystals at 25 to 500° C. H. T. Lee and R. M. Brick. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 13, 1955, 42 p.

Compression tests at room temperature and 300 and 500° C. conducted on single crystals of beryllium for various orientations. Tables, diagrams, graph, micrographs. 35 ref. (Q24, M26, Be)

990-Q. Grain Boundary Creep in Aluminum Bicrystals. F. N. Rhines, W. E. Bond and M. A. Kissel. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 14, 1955, 31 p.

Grain boundary shearing at high temperature and low tensile stress is found to be spasmodic, beginning with an induction period. Its direction depends exclusively upon that of the maximum shear stress in the grain boundary, but its rate depends as well upon the orientation relationships of the conjugate crystals. Diagrams, graphs, micrographs. 24 ref. (Q3, Q2, Al)

991-Q. Deformation and Fracture Mechanisms of Polycrystalline Magnesium at Low Temperatures. F. E. Hauser, P. R. Landon and J. E. Dorn. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 15, 1955, 19 p.

Determination of the deformation mechanisms in magnesium at low temperature by metallographic and X-ray techniques. Basal slip was found to be the main mechanism of deformation with duplex slip becoming more predominant as the tem-

perature was decreased. Micrographs. 6 ref. (Q24, Q26, Mg)

992-Q. Influence of Cold Work on Strength of Steel At Elevated Temperatures. Paul Shahinian. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 16, 1955, 19 p.

Effect of cold work on the high-temperature properties of a quenched and tempered chromium-molybdenum steel investigated by means of stress-rupture and relaxation tests. Tables, graphs. 16 ref. (Q23, Q4, Q24, AY)

993-Q. Notch Ductile High Strength Nodular Irons. G. A. Sandoz, H. F. Bishop and W. S. Pellini. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 21, 1955, 18 p.

Ferritized nodular iron may be reheated to intercritical temperatures to develop quasi-equilibrium mixtures of untransformed ferrite and austenite. Water quenching and 1200° F. tempering of the partially austenitized material produces high tensile strength and good notch ductility. Tensile strengths of 90,000 psi. may be developed with notch ductility properties equivalent to the ferritized 60,000-psi. grades. Micrographs, diagrams, graphs, tables. 6 ref. (Q23, CI)

994-Q. Fatigue and Anistropy in Copper. M. L. Ebner and W. A. Backofen. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 22, 1955, 13 p.

Copper of commercial purity has been found to exhibit a mechanical anisotropy under fatigue loading which is explained by postulating the presence of a fibrous structure of crack-like flaws aligned parallel to the axis of the wrought bar of test material. Graphs, diagram, photograph. 6 ref. (Q7, Cu)

995-Q. Tensile Properties of Zirconium-Chromium Alloys — Particle-Strengthening Effects. J. H. Keeler. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 26, 1955, 20 p.

Tensile properties of zirconium-chromium binary alloys containing up to 18 atm. % chromium reported for the temperature range −195 to 500° C. The highest yield strength obtained at 500° C. was about 26,000 psi. Tables, graphs, micrographs. 19 ref. (Q27, Zr)

996-Q. Progress in the Development of Creep-Resistant Zirconium Alloys. W. Chubb. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 27, 1955, 25 p.

Mechanical properties of alloys in selected alloy systems were measured at room temperature and 260 and 500° C. Alloys of the type zirconium-tin-molybdenum and zirconium-aluminum-columbium are relatively easy to fabricate, exhibit good strength and ductility at room temperature, and show promise for the development of creep-resistant alloys at 500° C. Tables, graphs. 16 ref. (Q3, Q general, Zr)

997-Q. Effect of Temperature on Delayed Yielding of Mild Steel for Short Loading Duration. Joseph M. Krafft. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 29, 1955, 15 p.

A bar loading technique was developed for applying uniform compressive stress for a duration of 100 microseconds and for allowing measurement of time delay before plastic yielding within this duration. With the apparatus, the relationship between loading stress and delay time was measured for a mild steel at five temperatures in the temperature range 100 to −196° C. Diagrams, graphs, micrograph. 15 ref. (Q23, CN)

998-Q. Static Fatigue of High-Strength Steel. R. H. Raring and J. A. Rinebolt. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 31, 1955, 12 p.

Susceptibility to static fatigue of air-melted, vacuum-melted and argon-melted AISI 4340 steel at the 230,000-psi. and 280,000-psi. strength levels determined by applying sustained loads to notched tensile specimens. Diagrams, graphs, micrographs. 6 ref. (Q7, AY)

999-Q. Mechanical Properties of Ti-Cr-Mo Alloys as Affected by Grain Size and Grain Shape. H. R. Ogden, F. C. Holden and R. I. Jaffee. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 34, 1955, 39 p.

Mechanical properties of an alpha, a metastable-beta, and an alpha-beta alloy are not altered significantly by changes in grain size or grain shape. Acicular types of structures, obtained by heating into the beta field prior to annealing in the alpha or alpha-beta field, cause a lowering of unnotched tensile ductilities to about the same values as notched tensile ductilities. Fatigue endurance limit is unaffected by grain size or shape and appears to be relatively unaffected by alloy content. Tables, diagrams, graphs, micrographs. 5 ref. (Q general, M27, N3, Ti)

1000-Q. The Initiation of Discontinuous Yielding in Ductile Molybdenum. J. A. Hendrickson, D. S. Wood and D. S. Clark. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 36, 1955, 22 p.

Results of experimental investigation of the initiation of yielding in fine-grained ductile molybdenum under rapidly applied constant stress. Diagrams, graphs, micrographs, tables. 13 ref. (Q23, Mo)

1001-Q. The Mechanical Properties of Vanadium-Base Alloys. W. Rostoker, A. S. Yamomoto and R. E. Riley. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 38, 1955, 22 p.

Tensile properties of unalloyed vanadium, and its binary and ternary alloys. Small additions of titanium and zirconium have a markedly beneficial effect on the ductility of vanadium. Tables, graphs, micrograph. 3 ref. (Q general, V)

1002-Q. Rolling Textures in Tantalum. J. W. Pugh and W. R. Hibbard, Jr. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 39, 1955, 14 p.

Cold rolled and recrystallized textures of tantalum presented as pole figures. Table, diagrams, micrographs. 19 ref. (Q24, Ta)

1003-Q. The Statistical Nature of Friction. E. Rabinowicz, B. G. Rightmire, C. E. Tedholm, and R. E. Williams. *ASME, Transactions,* v. 77, Oct. 1955, p. 981-984.

Sliding experiments using copper surfaces in solid contact. Friction traces analyzed statistically to study spontaneous fluctuations in the friction force. Diagram, graph. 6 ref. (Q9, Cu)

1004-Q. Residual Grinding Stresses in Hardened Steel. H. R. Letner. *ASME, Transactions,* v. 77, Oct. 1955, p. 1089-1098.

Residual stresses resulting from surface grinding a hardened ball-bearing-type steel under closely controlled conditions measured by deflection method. Effects of wheel grade, unit downfeed and grinding fluid upon the stresses generated. Diagram, table, photographs, graphs. (Q25, G18, ST)

1005-Q. The Determination of Residual Stresses in Hardened, Ground Steel. L. V. Colwell, M. J. Sinnott and J. C. Tobin. *ASME, Transactions,* v. 77, Oct. 1955, p. 1099-1104; disc., p. 1104-1105.

Residual surface stresses induced by grinding a hardened SAE 4340 steel investigated by means of X-ray diffraction and by optical interferometric methods. Depth of penetration of residual stresses increases as the severity of grinding is increased. Graphs, tables, diagram. 7 ref. (Q25, G18, AY)

1006-Q. Steam-Piping Design to Minimize Creep Concentrations. Ernest L. Robinson. *ASME, Transactions,* v. 77, Oct. 1955, p. 1147-1158; disc., p. 1158-1162.

Principles governing relaxation of expansion stresses during service at high temperature; possibility of creep concentrations in local spots of max. stress. Specific examples show that ordinary piping design usually can be made without such concentrations. Contrariwise, the type of expansion flexibility which invites excessive creep is illustrated. The desirability of cold springing pipe to minimize stress at high temperature is emphasized. Diagrams, graphs, table. 10 ref. (Q3, ST)

1007-Q. Friction in Cold Rolling and Its Governing Variables. P. W. Whitton. *Australasian Engineer,* 1955, Aug., p. 81, 10 pages.

Examination of effect of load, relative speed, surface finish and work hardening on copper, mild steel, brass and aluminum tested with various lubricants. Diagram, tables, plates. 10 ref. (Q9, F23, CN, Al, Cu)

1008-Q. Effect of Preheating on Residual Stresses in Mild-Steel Welds. L. E. Benson and S. J. Watson. *British Welding Journal,* v. 2, Sept. 1955, p. 372-376.

Mean axial contraction stresses measured in single-run and multi-run welds in mild steel. Tables, diagrams, photograph, graphs. (Q25, K general, AY)

1009-Q. Some Investigations of the Causes of Halo Formation. K. Winterton. *British Welding Journal,* v. 2, Sept. 1955, p. 385-392.

Appreciable strain together with hydrogen is necessary. Haloes are found only in fractured specimens. Micrographs, tables. 5 ref. (Q7, K general)

1010-Q. New Stainless Steels Qualify for High-Temperature Service. I. E. A. Loria. *Iron Age,* v. 176, Sept. 29, 1955, p. 65-67.

Crucible HNM exhibits best strength and ductility with solution temperature of 2000° F. and oil quenching. Graphs, tables. 3 ref. (To be continued.) (Q22, SS)

1011-Q. Internal Friction Peak Associated With Precipitation in an Al-Ag Alloy. A. C. Damask and A. S. Nowick. *Journal of Applied Physics,* v. 26, Sept. 1955, p. 1165-1172.

Specimen quenched from solid solution region and aged at 155° C. shows peak at 140° C. for vibration frequency of 0.25 c.p.s. Graphs. 19 ref. (Q22, Al, Ag)

1012-Q. Materials Engineering File Facts. Hardness Correlations for Titanium Alloys. *Material & Methods,* v. 42, Sept. 1955, p. 137.

Values obtained for Rockwell A and Diamond pyramid hardness values. Graphs. (Q29, Ti)

1013-Q. Residual Stresses. *Metal Progress,* v. 68, Aug. 15, 1955, p. 89-96.

Details for understanding and dealing with these not-to-be-overlooked disturbances. Graphs, diagrams, tables, photographs. (Q25)

1014-Q. Creep and Creep-Rupture Tests. *Metal Progress,* v. 68, Aug. 15, 1955, p. 175-184.

Equipment design recommendations, treatments of different types of data and effects of environment. Graphs, diagrams, circuit diagram, tables. (Q3)

1015-Q. Thermal Stress Fatigue in Austenitic Stainless. (Digest of "The Problem of Thermal Stress Fatigue in Austenitic Steels at Elevated Temperatures", by L. F. Coffin, Jr., American Society for Testing Materials, Special Technical Publication No. 165, October 1954, p. 32-50.) *Metal Progress,* v. 68, Sept. 1955, p. 180, 182, 184.

Test to determine mechanism of failures produced by a relatively limited number of thermal stress cycles under conditions of high cycling temperatures. (Q7, SS)

1016-Q. Effect of Stress Concentration on Rupture Strength. (Digest of "The Effects of Stress Concentrations on the Rupture Strength of Materials Subjected to Creep Loading", by G. Sachs, D. P. Newman and W. F. Brown; *Zeitschrift für Metallkunde,* v. 44, June 1953, p. 233-239.) *Metal Progress,* v. 68, Sept. 1955, p. 198, 200, 202.

Previously abstracted from original. See item 765-Q, 1953. (Q23)

1017-Q. Fatigue Tests on Notched and Unnotched Clad 24 S-T Sheet Specimens to Verify the Cumulative Damage Hypothesis. J. Schijve and F. A. Jacobs. *Netherlands National Luchtvaart-laboratorium Report* M. 1982, Apr. 1955, 66 p.

Attention is given to crack propagation, influence of cladding, inhomogeneity of sheet and distribution of fatigue test results. Graphs, diagrams, photographs, tables. (Q7, Al)

1018-Q. The Relation Between Friction and Wear for Boundary-Lubricated Surfaces. E. Rabinowicz. *Physical Society, Proceedings,* v. 68, no. 429B, Sept. 1955, p. 603-608.

Experiments in which metal transfer and loose wear were measured. Graphs. 7 ref. (Q9)

1019-Q. Deformation Properties of Friction Junctions. J. A. Greenwood and D. Tabor. *Physical Society, Proceedings,* v. 68, no. 429B, Sept. 1955, p. 609-619.

Investigation of sliding friction by shearing large-scale models under conditions where no displacements are allowed. Graphs, diagrams, tables. 6 ref. (Q9)

1020-Q. The Contact Resistance and Mechanical Properties of Surface Films on Metals. R. W. Wilson. *Physical Society, Proceedings,* v. 68, no. 429B, Sept. 1955, p. 625-641.

Investigation of electrical contact resistance and coefficient of friction of many noble and base metals in both clean and lubricated states. Diagrams, graphs, tables. 21 ref. (Q9, P15)

1021-Q. Preventing Embrittlement in Copper-to-Aluminum Weld Joints. C. L. Carlson and R. M. Leedy. *Product Engineering,* v. 26, Oct. 1955, p. 172-173.

Joint embrittlement results from logarithmic growth of a brittle diffusion layer. Safe temperature-with-time data given, as determined by impact test. Graph, diagram, micrographs. (Q23, K general, Al, Cu)

1022-Q. How to Prevent Fatigue Failures. Joseph Viglione. *Product Engineering,* v. 26, Oct. 1955, p. 174-178.

Practical, nonmetallurgical discussion of causes for fatigue failures, such as surface finishes and coatings, fillets, temperature and corrosion. Design suggestions for increasing fatigue life of welded and riveted joints and bolted connections. Photograph, tables. (Q7, K1, K13)

1023-Q. Apparatus for the Measurement of the Internal Friction of Metals in Transverse Vibration. B. S. Berry. *Review of Scientific Instruments,* v. 26, Sept. 1955, p. 884-887.

Incorporates specially designed piezoelectric pickup serving in turn as exciter and detector. Diagrams, graphs. (Q22)

1024-Q. Stress-Relaxation and Stress-Relief of Some Magnesium Alloys. Paul Klain. *Welding Journal,* v. 34, Sept. 1955, p. 415S-423S.

Stress-relaxation measurements by simple and cantilever beam and requirements of stress relief. Photographs, diagram, tables, graphs. 6 ref. (Q25, J1, Mg)

1025-Q. Stress Studies of Various Shaped Welded Doubler in Hatch Corner. H. Kihara, Y. Akita, N. Ando and K. Yoshimoto. *Welding Journal,* v. 34, Oct. 1955, p. 465S-471S.

Welded ship hatch corner specimens, with doubler reinforcements of various shapes welded thereto, tested under tension to determine most effective shape of doubler. Trapezoidal and oval shapes found to be the best. Diagrams, table, photograph, graphs. 4 ref. (Q25, K1)

1026-Q. Room Temperature Crack Propagation and Size Effect on Mild Steel. J. D. Lubahn. *Welding Journal,* v. 34, Oct. 1955, p. 518S-528S.

Observations of fracture during notch-bend tests. Photographs, micrographs, graphs, tables. 17 ref. (Q26, CN)

1027-Q. (English.) **Investigation on Acid-Resistant High-Silicon Iron. I.** Hiroshi Sawamura, Osamu Tajima and Kyoichi Akamatsu. *Kyoto University, Memoirs of the Faculty of Engineering,* v. 17, no. 3, July 1955, p. 231-251.

Effects of carbon and silicon contents on mechanical properties, corrosion resistance and shrinkage. Diagrams, graphs, tables, photographs, micrographs. 23 ref. (Q general, R general, C, Si, Fe)

1028-Q. (Czech.) **Testing of Metals for Relaxation at High Temperatures.** Alexander A. Chit'kov. *Hutnické listy,* v. 10, no. 8, Aug. 1955, p. 450-455.

Two theories for reconciling relation between creep and relaxation; differences between measured relaxation values and those calculated from creep values; Czech methods of measuring relaxation according to Barr and Bardgett. Tables, diagrams, photograph. (Q3)

1029-Q. (Czech.) **Cylinder Head Failures.** Jar. Pacher. *Strojirenstvi,* v. 5, no. 3, Mar. 1955, p. 195-198.

Effect of cooling rate on stresses and differences between thermal stressing of cylinder heads in gasoline and diesel engines; methods of determining stresses in castings; advantages of tensometric measurement; design changes by which cracking of cylinder heads was eliminated. Graphs, diagrams, table. 3 ref. (Q26, CI)

1030-Q. (Czech.) **Testing Material of Type CrV, CrMoV, and CrWV for Fatigue at Elevated Temperatures.** J. Buzek. *Strojirenstvi,* v. 5, no. 4, Apr. 1955, p. 282-285.

Chemical compositions and mechanical properties of materials tested, methods and testing equipment for bending and torsion fatigue testing. Graphs, circuit diagram, tables, photographs. (Q7, AY)

1031-Q. (French.) **Permanent Deformation of Polycrystalline Solids After the Action of a High Hydrostatic Pressure.** Hai Vu and Pierre Johannin. *Comptes rendus,* v. 241, no. 6, Aug. 8, 1955, p. 565-566.

Specimens of zinc, cadmium and aluminum were micrographed before and after hydrostatic compression. The first two are deformed, aluminum is not. Micrographs. (Q28, Zn, Cd, Al)

1032-Q. (French.) **Impact Testing of Lamellar Graphite Cast Irons.** G. N. J. Gilbert, *Fonderie,* 1955, no. 115, Aug., p. 4627-4640.

Characteristics that are measured during impact testing of gray cast iron. Role of the notch and the effects of various dimensions of bars. Tables, diagrams, photographs, graphs. 6 ref. (Q6, CI)

1033-Q. (German.) **Expansion-Free Directions in a Stress Condition and Its Importance for X-Ray Stress Measurement, and Study of Structures.** Fritz Binder and Eckard Macherauch. *Archiv für das Eisenhüttenwesen,* v. 26, no. 9, Sept. 1955, p. 541-545.

Equations for expansion-free directions, data of X-ray investigation, determination of lattice-constant-zero value, stress components, possibilities of verification of the elasticity theory. Graphs, diagrams. 14 ref. (Q25)

1034-Q. (Italian.) **On Knoop-Microhardness of a Series of Structural Constituents of Aluminum Alloys.** D. Gualandi and M. Paganelli. *Metallurgia italiana,* v. 47, no. 8, Aug. 1955, p. 362-366.

Tested with Tukon instrument for ten constituents. Photograph, micrographs, graphs. 10 ref. (Q29, M27, Al)

1035-Q. (Russian.) **Problem of the Nature of the Plastic Deformations of Surface Layers of Substances Subjected to Friction Processes.** K. V. Savitskii, E. N. Sokolkov, and V. D. Sadovskii. *Doklady akademii nauk SSSR,* v. 103, no. 4, Aug. 1, 1955, p. 605-608.

Dynamic and static compression; effect of tempering temperature and original structure; microhardness. Graphs. 3 ref. (Q29, Al, Cu)

1036-Q. (Russian.) **Mechanism of the Fracture of Specimens With a Standard Notch During Impact Bending.** B. S. Kasatkin. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 7, July, p. 75-83.

Passage of steel from tough to brittle state during impact bending, toughness in relation to temperature, microstructure of the deformed sector of metal around the notch as microrupture is about to develop, resulting microcracks, orientation, and spread. Diagrams, graph, photograph, micrographs. 5 ref. (Q5, Q6, Q26, ST)

1037-Q. (Russian.) **Creep of Cast Iron Containing Spherodial Graphite.** V. S. Ivanova and I. A. Oding. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 7, July, p. 89-92.

Microstructure, strength tests at 450° C., resistance of specimens to "growth", desirability of nodular iron as a structural material for service under high-temperature conditions. Micrograph, graph. 5 ref. (Q3, M27, CI)

1038-Q. (Russian.) **Effect of Plastic Deformation in the Austenitic State on Temper Brittleness of Structural Alloy Steels.** L. V. Smirnov, E. N. Sokolkov and V. D. Sadovskii. *Doklady akademii nauk SSSR,* v. 193, no. 4, Aug. 1, 1955, p. 609-610.

Reversible and irreversible temper brittleness, relation of impact toughness to tempering temperature after the usual quenching and hot working. Graphs. 5 ref. (Q24, Q23, ST)

1039-Q. (Russian.) **Development of "Embryonic" Cracks Affecting Brittle Strength of Substances.** B. Ia. Pines. *Zhurnal tekhnicheskoi fiziki,* v. 25, no. 8, Aug. 1955, p. 1399-1404.

Lack of agreement between values of "brittle strength", observed experimentally and those estimated according to magnitude of cohesive forces, has long been explained by the hypothesis of the presence in solid substances of so-called embryonic cracks which bring about premature failure. The author attempts to trace the origin of these cracks to molecular and atomic forces, the movement of vacancies, and diffusion peculiarities. 7 ref. (Q26)

R

Corrosion

408-R. Effect of Tempering Temperature on Stress-Corrosion Cracking and Hydrogen Embrittlement of Martensitic Stainless Steels. Peter Lillys and A. E. Nehrneberg. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 30, 1955. 27 p.

Tempering at about 500° F. provides minimum susceptibility to cracking by embrittlement for high levels of hardness, while maximum susceptibility to stress-corrosion cracking and embrittlement results between 800 and 1000°F. Delta ferrite minimizes the cracking tendency by narrowing the tempering range which produces susceptibility, and by interfering with crack propagation. Tables, photographs, micrographs, graphs. 22 ref. (R1, Q23, J29, SS)

409-R. Corrosion Resistant Aluminum Above 200° C. J. E. Draley and W. E. Ruther. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5430, July 1955, 37 p.

Alloy of 1% nickel in 2S aluminum is stable to 200° C. and above. Use and fabrication. Tables, graph, diagrams, photographs, micrographs. 7 ref. (R general, Al)

410-R. Reducing the Cost of Corrosion in Canada. H. P. Godard. *Chemistry in Canada,* v. 7, Sept. 1955, p. 35-38.

More common forms of corrosion, general principles of control, means by which industry can reduce its annual loss. Diagrams. (R general)

411-R. Corrosion Research Laboratories. V. Battelle Memorial Institute, U.S.A. Charles L. Peterson, Frederick W. Fink and Robert S. Peoples. *Corrosion Technology,* v. 2, Sept. 1955, p. 270-274.

Organization and objectives of Battelle and its facilities for studying corrosion under high temperature and pressure, erosion-corrosion, corrosion resulting from molten salts, mechanism and electrochemistry of corrosive attack and inhibition of corrosion by chemical means. Photographs. (R general, A9)

412-R. Staining of Engineering Components. R. Graham. *Corrosion Technology,* v. 2, Sept. 1955, p. 275-277.

Consider the stain stage of rusting, because this is period at which the maximum amount of information on rusting process might be obtained. Photograph. 7 ref. (R2, Fe)

413-R. The Corrosion of Aluminum and Its Alloys. C. Groot and R. M. Peekema. *Hanford Atomic Products Operation, (U. S. Atomic Energy Commission),* HW-36692, May 1955, 36 p.

Flow Cup Laboratory was established to screen aluminum alloys for corrosion in pile water as measured by weight loss, solution potentials and galvanic currents. Photographs, tables, graph. 4 ref. (R4, Al)

414-R. Effect of Thiourea Compounds on Dissolution Rate of Iron and Mild Steel. A. C. Makrides and Norman Hackerman. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 1, p. 1773-1781.

Acceleration is attributed to hydrogen sulfide produced by cathodic reduction of these compounds, while inhibition is considered to be result of retardation of the anodic process. Graphs, tables, diagram. 29 ref. (R6, R10, Fe, AY)

415-R. Kinetics and Mechanism of the Oxidation of Molybdenum. M. Simnad and Aija Spilners. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Sept. 1955, p. 1011-1016.

Rates of formation of different oxides on molybdenum, in pure oxygen at one atmosphere pressure, have been determined between 500 and 770° C. They grow almost entirely by diffusion of oxygen anions. Graphs, diagram. 16 ref. (R2, Mo)

416-R. Metal Coatings on Steel in Contact With Aluminium Alloys: Some Comparative Corrosion Tests. S. C. Britton and R. W. de Vere Stacpoole. *Metallurgia,* v. 52, no. 310, Aug. 1955, p. 64-70.

Steel nuts and screws, coated with zinc, cadmium or tin-zinc alloy, were tested on assemblies of five different aluminum alloys. Tin-zinc alloy performs best. Photographs, tables. 5 ref. (R11, Al, Cd, Zn, Sn)

417-R. Corrosion. A. H. Roebuck. Paper from "The Reactor Handbook". v. II. Engineering. AECD-3646. Technical Information Service, U. S. Atomic Energy Commission. Available from Superintendent of Documents, U. S. Government Printing Office, p. 193-233.

Selection of materials for water-cooled reactor systems involves establishing the effect of environment on corrosion of material and the effect of contamination by that material on the environment. Photographs, graphs, tables. 128 ref. (R general)

418-R. Corrosion Testing Facility and Disassembly Equipment. H. G. Duggan and D. T. Jones. Paper from "Fourth Annual Symposium on Hot Laboratories and Equipment". TID-5280. Office of Technical Services, U. S. Department of Commerce, p. 64-77.

Irradiates corrosion test specimens at constant pressure and temperature. Diagrams, photographs. (R11)

419-R. (Czech.) **Choice of Materials and Surface Protections for Tropical Climate.** K. Barton. *Strojirenstvi,* v. 5, no. 6, June 1955, p. 463-466.

Corrosion of metallic parts through atmospheric factors, including tropical moisture, rain and light; comparison of nickel and chromium-plating and zinc, cadmium and organic coatings; evaluation of parts made of stainless steel, zinc, copper, silver, aluminum and magnesium alloys. Table. 10 ref. (R3, SS, Cu, Zn, Al, Mg)

420-R. (French.) **Electrochemical Behavior of Tin Voltage-pH Equilibrium Diagrams of the Tin-Water System at 25° C. Corrosion of Tin. Electrolytic and Chemical Tinning.** E. Deltombe, N. de Zoubov and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 25, 1955, 24 p.

Free entnalpies of standard formation at 25° C., equilibrium reactions and formulas, interpretation of diagram with respect to the stability of tin and its oxides, corrosion and tin-plating. Tables, diagrams. 45 ref. (R4, L17, P15, Sn)

421-R. (German.) **The Corrosion of Alloyed Steels and Nickel Alloys by Phosphoric Acid.** Joh. Bünger. *Werkstoffe und Korrosion,* v. 6, nos. 8-9, Aug.-Sept. 1955, p. 369-374.

At high temperatures and concentrations the corrosion by phosphoric acid is so vigorous that the 70% nickel, 30% molybdenum alloy only is unaffected. Below 100° C., chromium-nickel steels are usually resistant. Graphs, tables. 9 ref. (R6, SS, Ni, Mo)

422-R. (German.) **Investigation of the Stress-Corrosion of Alpha Brass in Ammonia Vapors. I. Statistical Investigation of the Influence of Crystal Structure of the Life of Ring Specimens.** Franz Aebi. *Zeitschrift für Metallkunde,* v. 46, no. 8, Aug. 1955, p. 547-551.

Stress-corrosion characteristics of brass, effect of heat treatment on the improvement of specimen life, influence of impurities on the corrosion resistance. Tables, diagrams, photographs, X-ray diffractograms. 17 ref. (R1, R9, Cu)

423-R. (Russian.) **Methods of Testing Stainless Steels for Their Tendency to Intercrystalline Corrosion.** G. L. Shvarts, I. I. Kazennov and E. I. Astrov. *Zavodskaia laboratoriia,* v. 21, no. 8, Aug. 1955, p. 922-930.

To show the inadequacies of accepted methods, tests were made on welded joints in sulfuric and nitric acids and other corrosive media. Resistance to corrosion is demonstrated on steels subjected to boiling acid media. Diagrams, tables, micrographs. (R11, R1, SS)

424-R. (Russian.) **Problem of Accelerating the Tendency of Stainless Austenitic Steels to Intercrystalline Corrosion.** I. L. Rozenfel'd, Z. A. Vrutsevich, E. I. Titkova and M. V. Beganov. *Zavodskaia laboratoriia,* v. 21, no. 8, Aug. 1955, p. 934-936.

Comparison of sulfuric acid plus copper sulfate, and other combinations, in one and two-day tests. Micrographs. 6 ref. (R5, R11, SS)

425-R. (Russian.) **Methods of Testing Stainless Steels for Intercrystalline Corrosion.** A. V. Shreider. *Zavodskaia, laboratoriia,* v. 21, no. 8, Aug. 1955, p. 937-940.

Effect of ratio of titanium to carbon, anode etching in acids. Graphs. 10 ref. (R11, R2, SS)

426-R. (Russian.) **Methods of Determining the Total Corrosion Resistance of Welded Joints of Stainless Steel in Boiling Nitric Acid.** B. I. Medovar and N. A. Langer. *Zavodskaia laboratoriia,* v. 21, no. 8, Aug. 1955, p. 941-944.

Microstructure revealed by electrolytic etching in a solution of oxalic acid. Diagram, table, micrographs. 10 ref. (R11, M27, SS)

427-R. Effects of Chemical Composition and Heat Treatment Upon the Microstructure and Corrosion Resistance of AISI Types 309 and 310. D. J. Carney and E. R. Rosenow. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 8, 1955, 21 p.

Samples, with varying carbon and nitrogen contents, were subjected to different solution annealing treatments and cooling rates. Effects of carbon and nitrogen on intergranular corrosion restistance showed that variations in the processing affected microstructure to such an extent that in some cases heats containing higher carbon contents yielded improved intergranular corrosion re-

sistance. Tables, graphs, micrographs. 4 ref.
(R2, M27, J general, SS)

428-R. The Evaluation of Corrosion Resistance for Gas-Turbine-Blade Materials. W. E. Young, A. E. Hershey and C. E. Hussey. *ASME, Transactions,* v. 77, Oct. 1955, p. 985-994.

Surface analysis of gas-turbine-blade material before and after exposure to the combustion products of residual fuel oils, demonstrates corrosive effect of these products; a measurable indication may be obtained in a fraction of the testing time required to produce appreciable weight loss. Diagrams, photographs, graphs, tables. 10 ref. (R7, SG-h)

429-R. Recent Investigations of the Mechanics of Cavitation and Cavitation Damage. Robert T. Knapp. *ASME, Transactions,* v. 77, Oct. 1955, p. 1045-1054.

Water-tunnel investigations into the mechanics of "fixed"-type cavitation and into the probable mechanism through which this type causes material damage. High-speed motion pictures used to study the cavity mechanics; indications of the damage pattern obtained by measuring pitting rate on soft aluminum test specimens. Photographs, diagram, graphs, tables, micrographs. 18 ref. (R2, R11, Al)

430-R. On the Mechanism of Cavitation Damage. M. S. Plesset and A. T. Ellis. *ASME, Transactions,* v. 77, Oct. 1955, p. 1055-1064.

New method for producing cavitation damage in the laboratory in which the test specimen has no mechanical accelerations applied to it in contrast with the conventional magnetostriction device. Alternating pressures are generated in the water over the specimen by exciting a resonance in the water cavity. Diagrams, tables, photographs, micrographs. 8 ref. (R2)

431-R. Corrosion of Metals in High Temperature Water at 500° F. and 600° F. S. C. Datsko. *Argonne National Laboratory, (U. S. Atomic Energy Commission),* ANL-5354, Oct. 1954, 203 p.

Stainless steel of the 300 series and certain types of zirconium have been found to be satisfactory in all test environments. Tables, photographs, micrographs, diagram.
(R4, SS, Zr)

432-R. Theory of Corrosion and Passivity of Iron. W. T. Denholm. *Australasian Engineer,* 1955, Aug., p. 46-56.

Applies pH-potential diagram. Thermodynamic evidence supports view that anodic passivation occurs by adsorption of monolayer of oxygen on metal atoms still in solid lattice. Table, graphs, diagrams. 25 ref. (R10, Fe)

433-R. Nature of the Passive Film on Iron in Concentrated Nitric Acid. Herbert H. Uhlig and Thomas L. O'Connor. *Electrochemical Society, Journal,* v. 102, Oct. 1955, p. 562-572.

Shown to be ferric acid or related higher-valence iron compound and calculated to form a film of ferric oxide 40 to 125 A. thick. Tables, graphs. 39 ref. (R10, Fe)

434-R. The Nature of Aluminum as a Cathode. M. J. Pryor and D. S. Keir. *Electrochemical Society, Journal,* v. 102, Oct. 1955, p. 605-607.

Throws new light on high resistance to chloride solutions and on limited sensitivity of corrosion to presence of oxygen. Graph, tables, micrographs. 14 ref. (R5, R9, Al)

435-R. Protective Packaging of Foods Against Moisture Condensation. J. G. Woodroof and E. K. Heaton. *Food Technology,* v. 9, Oct. 1955, p. 510-518.

Mechanism and case histories of rusting of cans. Ways to prevent rusting by protective packaging. Tables, photographs, graph. 18 ref. (R3, R4)

436-R. Corrosion of Aluminium and Aluminium Alloys in Aqueous Solutions at High Temperatures. K. Carlsen. *International Conference on the Peaceful Uses of Atomic Energy,* A/-CONF.8/P/880, June 1955, 13 p.

Short tests were run at 230° C. on commercial alloys which would be suitable for power reactors. Tables. 9 ref. (R5, Al)

437-R. The Effects of Repeated Washing of Tinned Steel With Alkaline Solutions on its Resistance to Rusting. S. C. Britton and D. G. Michael. *Journal of Applied Chemistry,* v. 5, Aug. 1955, p. 402-414.

Rate of corrosion of specimens either intermittently or continuously immersed in equivalent caustic alkalinity solutions of sodium hydroxide, carbonate or phosphate with additions of either sodium sulfite, chromate or hypochlorite. Tables, photographs. 8 ref.
(R5, Sn, ST)

438-R. The Mechanism of the Inhibition of Corrosion by the Pertechnetate Ion. I. The Origin and Nature of Reaction Products. G. H. Cartledge. *Journal of Physical Chemistry,* v. 59, Sept. 1955, p. 979-984.

In tests with iron and steel, permanently deposited activity is associated with anodic action of active sites, but inhibition is not dependent upon such action. Autoradiogram, tables. 12 ref.
(R10, Tc, Fe, ST)

439-R. Better Performance From Metals. J. Harry Jackson. *Southern Pulp and Paper Manufacturer,* v. 18, Sept. 1955, p. 55 + 4 pages.

Intermetallic corrosion control must include avoidance of notch formation. Selection of metals with balanced strength, ductility and toughness, avoiding defects in castings and weldments, are essential for good service life. Stainless steels met these requirements. Table, graphs, micrographs.
(R5, R6, R7, Q general, SS)

440-R. Application of Glassy Phosphates for Corrosion Control. George Illig. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 102, v. 48, no. 10, Aug. 1955, p. 4-10.

Use and mechanism of action in industrial and municipal water systems. 11 ref. (R10)

441-R. Corrosion Control in Industrial and Steam Power Plants. Ralph M. Lemen. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 102, v. 48, no. 10, Aug. 1955, p. 11-16.

Review of corrosion in various items of equipment; control measures. (R4)

442-R. The Use of Lime in Corrosion Control. T. C. Miller. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 102, v. 48, no. 10 Aug. 1955, p 17-19.

Use in controlling corrosive properties of water. (R4, R10)

443-R. Effect of Preheating on Stress-Corrosion Cracking of Steel Weldments. E. Paul Degarmo and I. Cornet. *Welding Journal,* v. 34, Oct. 1955, p. 472S-475S.

Specimens 2 ft. x 2 ft. x ½ in., made of three steels containing from 0.09 to 0.24% carbon and having a 2-ft. submerged-arc weld, were immersed in aqueous solution of 60% calcium nitrate and 3% ammonium nitrate at 225 to 235° F. Tables, photographs, graphs. 3 ref.
(R1, K1, ST)

444-R. (French.) Relation Between Metallographic Structure and Liability to Intercrystalline Corrosion of a Al-5% Cu Binary Alloy. M. Paganelli. *Alluminio,* v. 24, no. 4, July-Aug. 1955, p. 335-343.

It has been noticed that artificial aging causes discontinuities in the structure of 5% cu aluminum alloy when rolled and heat treated at 160 and 190° C. Consequently the alloy becomes liable to corrosion around the zones of preferential reprecipitation. Tables, micrographs, graph. 7 ref. (R2, N5, Al)

445-R. (French.) Steels and Alloys Resistant to Corrosion at High Temperatures. Louis Colombier. *Métaux, corrosion-industries,* v. 30, nos. 359-360, July-Aug. 1955, p. 294-303.

Study of low iron and iron-nickel base alloys with regard to their resistance to oxidation and the action of nitrogen, hydrogen, sulfur compounds, combustion gases and other media. Graphs, tables. (R9, Fe, Ni)

446-R. (Russian.) Hydraulic Method of Protecting Turbines From Cavitation Erosion. K. K. Shal'nev. *Vestnik akademii nauk SSSR,* v. 25, no. 8, Aug. 1955, p. 50-52.

Technological methods of protection involve use of high-alloy metals in the building or repair of turbines and turbine parts. However, the hydraulic methods produce better design and smoother, streamlined parts. Diagrams. (R2)

447-R. (Russian.) Study of the Corrosion of Cadmium and Zinc by the Polarographic Method. A. Ia. Shatalov. *Zhurnal prikladnoi khimii,* v. 28, no. 9, Sept. 1955, p. 944-949.

Corrosion in chloride and other solutions of pure and technical cadmium and zinc; effect of pH on the potential of the metal; time factor in corrosion. Graphs, tables. 7 ref.
(R5, R11, Cd, Zn)

S

Inspection and Control

276-S. Polarographic Analysis for Faster and Better Mill Control. Hidehiko Mino. *Engineering and Mining Journal,* v. 156, Sept. 1955, p. 97-99.

Small instrument makes analyses of heads, tails, cell-to-cell concentrates and finished concentrates, and cuts sample time to 15 min. and sample cost to 1/18 that of conventional chemical methods. Photograph, graph, diagrams. (S11)

277-S. Inspection Methods for Metallic Parts. A. S. Billings. *Finish,* v. 12, Oct. 1955, p. 36-37, 78, 83-84.

X-ray, fluorescent and dye penetrants, magnetic particle, spectroscopy and X-ray metallography are used in production and raw material checks. Photographs. (S general)

278-S. Quality Control in a Large Foundry in the Automotive Industry. R. Baggio. *Foundry Trade Journal,* v. 99, Sept. 1, 1955. p. 229-240.

Systematic tests of raw materials and finished products. Photographs, graphs. (S general, E general, CI)

279-S. Rigidity — The Unknown Cost-Reduction Factor. C. A. Bierlein. *Mechanical Engineering,* v. 77, Sept. 1955 p. 774-777.

Failure of conventional gaging to show true geometry and value of rigidity in improving this situation. Photographs, diagrams. (S14)

280-S. Results of an Examination of Metal Specimens From an Excavation of Shamshir Ghar Afghanistan.

Earle R. Caley and Wallace H. Deebel. *Ohio Journal of Science*, v. 55, Sept. 1955, p. 311-314.

The wide variety of alloys and metallurgical techniques, represented by the few specimens, indicate an advanced stage in the art of metallurgy was possible only on the basis of long experience and practice. Tables. (S11, A2, Sn, Cu, CI)

281-S. (French.) **New Proposal for the Standardization of Gray Cast Irons.** Albert Collaud. *von Roll Mitteilungen*, v. 13, nos. 3-4, July-Dec. 1954, p. 75-97.

Primary structure (segregation of graphite) as well as the secondary structure (matrix) of gray cast iron depends on two factors which are completely independent of each other—the physico-chemical composition and the rate of cooling. A more realistic standard is proposed. Tables, graphs. (S22, CI)

282-S. (Hungarian.) **Problems of Sampling Specimens in the Metallurgical Plant.** Robert Forbath. *Kohaszati lapok*, v. 10, no. 8, Aug. 1955, p. 357-360.

Training of technicians, location of layer from which sample is taken, equipment as possible sources of error. Diagram, photograph. 7 ref. (S12)

283-S. (Hungarian.) **Determination of the Manganese Content of Silicate Rock, and Ferrous and Manganese Ores.** Béla Simo. *Kohaszati lapok*, v. 10, no. 8, Aug. 1955, p. 361-365.

Investigations on photometric determination for shortening the determination time and savings on chemicals. Tables, graphs. 7 ref. (S11, Mn)

284-S. (Polish.) **New Standards for Magnesium and Its Alloys.** Boleslaw Chudzio. *Wiadomosci hutnicze*, v. 11, nos. 7-8, July-Aug. 1955, p. 220-223.

Chemical composition and mechanical properties of electrolytic magnesium and forging and casting alloys. Tables. (S22, Mg)

285-S. (Russian.) **Polarographic Determination of Columbium and Titanium From Sulfuric Acid Solutions.** E. I. Krylov and V. S. Kolevatova. *Zadvodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 911-913.

Method tested on titanium-columbium minerals, such as pyrochlore, and on technical columbium pentoxide. Graphs, table. 9 ref. (S11, Cb, Ti)

286-S. (Russian.) **An Experiment in Impact Service Testing.** G. V. Zarochentsev. *Zavodskaia laboratoriia*, v. 21, no. 8, Aug. 1955, p. 965-971.

Process of brittle fracture of rails, comparison of brittleness and cold shortness of differently shaped rails, effect of low temperatures. Diagrams. photographs, graphs, tables. (S21, Q26, Q6, ST)

287-S. An Approach to the Study of the Effect of Rare-Earth Additions to Steel by Use of Radioactive Tracer Techniques. C. S. Dumont, J. E. Gates and C. M. Henderson. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 18, 1955, 17 p.

Additions of radioactive misch metal are uniformly distributed throughout the matrix of 25% nickel, 20% chromium melt. Examination of various samples by a combined metallographic - autoradiographic technique showed some slight concentration of radioactivity in the inter-dendritic zones of the as-slow-cooled sample. The forged specimens showed some variation in the degree of concentration between the outer and center sections of the samples. Tables, diagram, micrographs. 5 ref. (S19, F22, M27, SS)

288-S. Colorimetric Determination of Combined Carbon in Cast Iron. A. Jamieson. *Foundry*, v. 83, Oct. 1955, p. 132-134.

Method is rapid and apparently not too sensitive to operating variables, is reproducible and of acceptable accuracy. Tables, graphs. (S11, C, CI)

289-S. How to Get More for Your Steel Dollar. *Iron Age*, v. 176, Oct. 6, 1955, p. 190-204.

Data for purchasing agents on sheet, strip, bars and shapes. Includes working tolerances, heat treating, and materials inspection. Diagrams. (S22, ST)

290-S. Materials Engineering File Facts. Standard Aluminum Automotive Alloys in United States and Great Britain. *Materials & Methods*, v. 42, Oct. 1955, p. 137-139.

Tables on wrought alloys, work hardening wrought alloys and casting alloys cover forms, designations and temper. Tables. (S22, Al)

291-S. A.I.S.I. Standard Alloy Steel Compositions. *Metal Progress*, v. 68, Aug. 15, 1955, p. 120B.

A.I.S.I. list, revised Feb. 1954, for openhearth and electric furnace alloy steels. Table. (S22, ST)

292-S. Radiography of Metals. *Metal Progress*, v. 68, Aug. 15, 1955, p. 185-194.

Suggestions for equipment and applications of transmission radiography. Tables, graphs. 4 ref. (S13)

293-S. Surface Finish of Metals. *Metal Progress*, v. 68, Aug. 15, 1955, p. 82-88.

Establishment of standards and economical application to production. Diagrams, tables, photographs, graphs. (S15, S22)

294-S. Testing, Inspection and Quality Control. Don M. McCutcheon. *Metal Progress*, v. 68, Sept. 1955, p. 141-143.

Nondestructive test methods and trends. Photograph. (S general)

295-S. Quality Control Through Nondestructive Testing With Eddy Currents. Lee A. Cosgrove. *Nondestructive Testing*, v. 13, Sept.-Oct. 1955, p.13-15.

By measuring electrical conductivities of aluminum alloys, the instrument can sort and classify mixed alloys, disclose improper heat treatment, and detect surface flaws. Photograph, table. 4 ref. (S13, Al)

296-S. Ultrasonic Flawplotting Equipment—a New Concept for Industrial Inspection. R. W. Buchanan and C. H. Hastings. *Nondestructive Testing*, v. 13, Sept.-Oct. 1955, p. 17-25.

Equipment combines modulated water stream acoustic coupling, plan and cross-section-view pictorial presentation of flaw images, and manually operated search scanner capable of coping with wide variety of specimen geometry. Photographs, diagrams. 4 ref. (S13)

297-S. Van de Graaff Radiography of High Density Alloys. Robert E. Droegkamp. *Nondestructive Testing*, v. 13, Sept-Oct. 1955, p. 27-30.

Studies on hafnium, uranium-base ingots and Zircoloy. Quality is not as good as can be obtained on low-density materials using lower voltage X-ray machines. Table, graph, photographs. 4 ref. (S13, Zr, Hf, U)

298-S. A Method for the Measurement of DC Magnetic Fields and DC Field Differences and Its Application to Nondestructive Testing. Friedrich Foerster. *Nondestructive Testing*, v. 13, Sept.-Oct. 1955, p. 31-41. (Translated from the German).

Field strength meter can be converted into field strength difference meter by turning one of two probe coils in opposite direction. Photographs, diagrams. 5 ref. (S13, Fe)

299-S. Technical Radiography With Beta-Emitting Isotopes. J. G. Kereiakes and A. T. Krebs. *Nondestructive Testing*, v. 13, Sept.-Oct. 1955, p. 43-44.

Radiographs obtained by using strontium-90 and yttrium-90 compare favorably with those using gamma-emitting istopes. Photographs. 19 ref. (S13)

300-S. Detection of Flaws in Jet Engine Parts by Ultrasonics. M. J. Bratt and Vernon I. E. Wiegand. *Nondestructive Testing*, v. 13, Sept.-Oct. 1955, p. 45-47, 59.

Shows value in jet engine manufacturing plant of General Electric Co. Photographs. (S13)

301-S. Standards for Welding: Complicated and Confusing. Ray A. Mueller. *Welding Engineer*, v. 40, Oct. 1955, p. 35-40.

Discussion of the 19 extant codes and suggestions for preparing one procedure. Tables, diagrams. (S22, K general)

302-S. Shop Methods for Identifying Some Metals Prior to Welding. Arthur L. Phillips. *Welding Journal*, v. 34, Sept. 1955, p. 877-881.

Even though an expert spark tester can identify constituents and percentages with great accuracy, other methods such as hardness, chip, and spark testing, and use and shape identification should be employed to specify correct alloy for metal joining. Photographs, diagrams. (S10, K general)

303-S. Backing Ring Elimination Permits Ultrasonic Testing and Avoids Cracking at Piping Welds. W. A. Pollock. *Welding Journal*, v. 34, Oct. 1955, p. 954-960.

Pipe welds made without backing rings can be examined by relatively low cost ultrasonic inspection. Also, this technique excludes stress concentration at root of weld and the related hazard of cracking. Photographs, diagrams. 8 ref. (S13, K1, AY)

304-S. Radiography in the Jungles of Sumatra. W. W. Offner. *Welding Journal*, v. 34, Oct. 1955, p. 961-965.

Construction and weld inspection of large oil storage tanks at an ocean fueling station. Photographs, diagrams. (S13, K1, CN)

305-S. Product Standards for Die Castings. Alan G. Dimond. *Western Machinery and Steel World*, v. 46, Sept. 1955, p. 78-82.

Tolerances being released by American Die Casting Institute. Photographs, diagrams, graphs. (S22, E13)

306-S. Study of the Buoyancy Method of Phase Analysis for Carbon in Steels. Yu. A. Klyachko and M. M. Shapiro. *Henry Brutcher Translation No.* 3526, 16 p. (Abridged from *Zavodskaya laboratoriya*, v. 16, no. 10, 1950, p. 1173-1182.) Henry Brutcher, Altadena, Calif.

Prevention of changes in carbon content of carbide residue obtained by electrolytic solution; changes in iron content of the residue during preparation and separation of heavy liquids; nature of reaction of cementite with solution, and formulas expressing it. Tables, X-ray diffraction patterns, graphs, micrographs. 6 ref. (S11, ST)

307-S. Isolation of Carbide Phase Under Constant Conditions. N. M. Popova and M. F. Rybina. *Henry Brutcher Translation No.* 3567, 6 p. (Abridged from *Zavodskaya laboratoriya*, v. 14, no. 5, 1948, p.555-557.) Henry Brutcher, Altadena, Calif.

A new apparatus for anodic solution of steel samples with continuous removal of deposit in a stream

of cooled electrolyte. Diagram, photograph, table. (S11, ST)

308-S. (French.) **Application of Tolerance Rules in the Arms Factory.** R. de Gunst. *Revue universelle des mines*, v. 11, ser. 9, no. 9, Sept. 1955, p. 428-435.

Characteristics of pieces of arms, main dimensioning and tolerance principles, organizing the work of a research office, benefits derived from correct dimensioning. Diagrams. (S14)

309-S. (French.) **Basis of Dimensional Control in Industry. Checking Parallelepiped Gages.** E. Bodart and J. Simonet. *Revue universelle des mines*, v. 11, ser. 9, no. 9, Sept. 1955, p. 448-460.

Methods of measuring gages by luminous interferences. Principles of interferometers used in laboratories for this work and their precision. Diagrams, photographs, table. (S14)

310-S. (French.) **French Methods and Apparatus for Measuring the Finish of Surfaces.** André Mirau. *Revue universelle des mines*, v. 11, ser. 9, no. 9, Sept. 1955, p. 461-469.

Describes a pneumatic examining instrument, the use of calibrated specimens, three microscopes using luminous interferences, and other methods for measuring surface roughnesses. Diagrams, graph, photographs, micrographs. (S15)

311-S. (German.) **Trace Analyses With Radioactive Isotopes. Activation Analysis of Phosphorus and Iron.** Wilfrid Herr. *Archiv für das Eisenhüttenwesen*, v. 26, no. 9, Sept. 1955, p. 523-526 .

Fundamentals of activation analysis, its most important advantages, drawbacks and possibilities. Graphs. 11 ref. (S11, S19, Fe)

312-S. (German.) **The Question of Minimum Values for the Breaking Elongation and Yielding Point When Accepting Rolled Products From Mass Structural Steel.** Stefan Kronmarck. *Metallurgie*, v. 5, no. 7, July 1955, p. 212-214.

Contribution to establishment of technical standards, quality specifications and terms of delivery for mass structural steel. Graphs, table. (S22, ST)

313-S. (German.) **The Analytical Determination of Indium for the Operational Control of the Wet Metallurgical Zinc Production.** Wolfgang Zimmer. *Metallurgie*, v. 5, no. 7, July 1955, p. 214-216.

Serviceable method described; reference made to unsuccessful methods. Tables, photograph. 6 ref. (S11, In, Zn)

314-S. (German) **Influence of Machine Tool Materials and Tools on the Quality of the Tooth Surface. I. Measuring Devices and the Roughness of Tooth Surfaces.** W. Hagen. *VDI Zeitschrift*, v. 97, no. 25, Sept. 1, 1955, p. 849-859.

Methods of roughness determination, influence of the method of machining and tools on the surface finish. Micrographs. 5 ref. (S15, G17)

315-S. (German.) **Determination of Small Quantities of Thallium in Lead. Extraction of Thallium (III)-Chlorides by Isopropyl Ether.** Kaarina Lounamaa. *Zeitschrift für analytische Chemie*, v. 147, no. 3, 1955, p. 196-198.

Thallium as a chloride is extracted from a solution oxidized by bromide and then iodometrically titrated. Tables. 7 ref. (S11, T1, Pb)

316-S. (Russian.) **Transactions of the Ninth-All-Union Conference on Spectroscopy.** *Izvestiia akademii nauk SSSR, seriia fizicheskaia*, v. 19, no. 2, 1955, p. 1-248.

Third in a series of reports pertaining to applications of spectral analysis in metallurgy. (S11)

317-S. (Book.) **Specification Handbook.** 5th Ed. 139 p. North American Smelting Co., Marine Terminal, Wilmington, Del.

Compilation of specifications issued by government agencies and metallurgical societies on standard brass, bronze, aluminum, foundry alloys, and fabricated shapes. (S22, Cu, Al)

T Applications of Metals in Equipment

152-T. Aluminum Die Castings for Carrier Telephone Systems. Ludwig Pedersen. *Communication and Electronics*. 1955, no. 20, Sept., p. 434-439.

Die casting, termed the shortest distance between raw material and finished product, provides low-cost equipment. Photographs. 2 ref. (T1, Al)

153-T. A Discussion of Economic Factors Affecting the Steel Selection and Heat Treatment for Automotive Gears. Vernon E. Hense and Donald P. Buswell. *General Motors Engineering Journal*, v. 2, Sept.-Oct. 1955, p. 2-10.

Gear design, specific application and required quality level as well as cost, availability, machinability, heat treating characteristics and performance and uniformity properties govern steel selection. Heat treating depends on cost and overall effect on gear's subsequent processing. Photographs, tables, micrographs. (T7, T21, ST)

154-T. Why Bearings Seize. Arvid E. Roach and Carl L. Goodzeit. *General Motors Engineering Journal*, v. 2, Sept.-Oct. 1955, p. 25-29.

Experiments have confirmed a new bearing metal theory which clarifies and unifies the empirical data about bearing materials, and provides a useful basis for selection of new materials. Tables, graphs, photographs. (T7, Q9, SG-c)

155-T. Aluminum Alloys. Harry W. Fritts and Ralph L. Horst, Jr. *Industrial and Engineering Chemistry*, v. 47, Sept. 1955, pt. 2, p. 1946-1952.

Advantages of use in industrial applications. Photographs. 71 ref. (T general, Al)

156-T. Tin and Its Alloys. Robert J. Nekervis. *Industrial and Engineering Chemistry*, v. 47, Sept. 1955, pt. 2, p. 2036-2040.

Review of developments of major interest with emphasis on tin alloy coatings. Photographs. 125 ref. (T general, L general, Sn)

157-T. High Temperature Thermocouple. R. C. Jewell, E. G. Knowles and T. Land. *Metal Industry*, v. 87, Sept. 9, 1955, p. 217-221.

Results of exploring platinum-rhodium system of alloys beyond 13% rhodium. Diagram, photograph, micrographs, table. 11 ref. (T8, M24, Pt, Rh)

158-T. The Selection of Material for Press Forming Dies. *Metal Progress*, v. 68, Aug. 15, 1955, p. 12-20.

Operations involve bending and mild or moderate stretching of the sheet. Selection of die material is based on the previous performance of similar tools from 504 specific sets of conditions. Tables, diagrams. (T5, G1, TS, Zn)

159-T. The Trend to Light Metals in Materials Handling Equipment. E. A. Farrell. *Modern Metals*, v. 11, Sept. 1955, p. 40 + 4 pages.

Since materials handling accounts for 30 to 85% of finished goods cost, economy there can be significant. Aluminum and magnesium are preferred. Photographs. (T5, Al, Mg)

160-T. (Czech.) **Zinc-Alloy Dies.** J. Luboinski and W. Szczepinski. *Strojirenska vyroba*, v. 3, no. 5, May 1955, p. 195-197.

Service life and economics of cutting and punching zinc alloy dies compared with those of other materials; strength, hardness and wear. Diagrams, photograph. (T5, Zn)

161-T. (German.) **Economies Obtainable in Using Aluminum for Commercial Vehicles.** E. Litz and H. Croseck. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 409-413.

Ratio of payload to deadload reveals clearly the fundamental advantage of aluminum vehicles; despite higher capital costs an aluminum vehicle very quickly pays for itself. Tables, photographs, graphs. (T21, Al)

162-T. (German.) **Aluminum in the Construction of Trucks.** H. Suppus. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 414-418.

Chassis girders, floors, sides and tarpaulin supports for open-structure trucks. Diagrams, photographs. (T21, Al)

163-T. (German.) **Wheels, Brakes, and Aluminum.** H. Suppus. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 419-422.

Interaction between ratio of spring-mounted main mass of car to the tire-supported suspension and position of car on road. Diagrams. (T21, Al)

164-T. (German.) **Present Extent of Use of Aluminum for Commercial Vehicles in Europe.** P. Krekel. *Aluminium*, v. 31, no. 9, Sept. 1955, p. 423-432.

Swiss, British, French and Italian designs. Photographs, diagrams. (T21, Al)

165-T. (German.) **Uses of Permanent Magnets in Fields Other Than Electrical Engineering.** H. Fahlenbrach. *Technische Mitteilungen Krupp*, v. 13, no. 4, Aug. 1955, p. 107-108.

Use of permanent magnets in magnetic separators, filters, dampers, brakes and collectors. Diagrams, photograph. (T5, T general, SG-n)

166-T. (German.) **The Sintered Metal Filters and Their Structure, Properties, and Application.** F. Frehn, W. Hotop and G. Stempel. *Werkstoffe und Korrosion*, v. 6, nos. 8-9, Aug.-Sept. 1955, p. 385-389.

Pressure drop, chemical resistance and mechanical and physical properties. Diagrams, photographs, graphs, table. 2 ref. (T29)

167-T. (Russian.) **Electrodes for Welding Austenitic Steels Intended for Long Operation at High Temperatures.** L. G. Petrov and V. V. Kyrchenov. *Svarochnoe proizvodstvo*, 1955, no. 8, Aug., p. 9-13.

Chemical compositions, microstructure and mechanical characteristics of welded-on metal in original state and after aging; welding conditions for obtaining a stable crystalline structure. Tables, graphs, micrographs, structural diagram, diagrams. 5 ref. (T5, K1, M26, ST)

168-T. Experimental High-Temperature Materials for Gas Turbines. A. R. Edwards. *Australasian Engineer*, 1955, July, p. 50-55.

Applications for sintered oxides and carbides (nonmetallic), cermets, molybdenum and chromium alloys in

specific locations. Graphs. 17 ref. (T25, SGh)

169-T. Titanium Alloys for Aircraft. H. V. Kinsey. *Canadian Aeronautical Journal,* v. 1, no. 4, Sept. 1955, p. 104-108.

Considers commercially available alloys, forging, forming, welding and machining. Tables, diagrams. 21 ref. (T24, Ti)

170-T. The Metallurgy of Reactor Fuels. J. P. Howe. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/825, July 1955, 46 p.

Applications, requirements and limitations of distinct types of elements; materials and methods used in manufacture; physical and chemical metallurgy of uranium, thorium, zirconium and others. Tables, diagrams, graphs, photographs. 33 ref. (T25, U, Th, Zr)

171-T. Answers to 10 Questions Help You Pick the Right Steel. J. J. Hauptly. *Materials & Methods,* v. 42, Sept. 1955, p. 86-93.

Method for selecting the proper steel for most applications. Various commercial steels arranged in groups according to properties and fabrication characteristics. Tables, photographs. (T general, ST)

172-T. Fluorocarbon + Porous Bronze + Steel Backing = New Dry Bearing Material. *Materials & Methods,* v. 42, Sept. 1955, p. 94-95.

Excellent friction, chemical and wear properties of polytetrafluoroethylene are combined with strength, thermal conductivity and dimensional stability of metals by impregnating porous metal matrix with resin. Photographs, table (T7, SG-c)

173-T. Special Uses Call for Tailor-Made Steels. A. M. Hall. *Materials & Methods,* v. 42, Oct. 1955, p. 92-99.

New steels and modifications of existing ones are in demand to meet requirements of today's applications. Photographs. (T general, AY)

174-T. Which Alloys for Jet Hot Spots? S. G. Demirjian. *Materials & Methods,* v. 42, Oct. 1955, p. 116-118.

Consideration of compression, combustion, nozzle, turbine, and tailcone area of jet engines. Photographs, graph, micrograph, table. (T24, T25, SG-h)

175-T. The Selection and Application of Stainless Steel in the Chemical Process Industries. *Metal Progress,* v. 68, Aug. 15, 1955, p. 37-49.

Stainless steel is subject to general and intergranular corrosion, stress-corrosion cracking, and pitting. Types of attack and the effects of selected reagents. Tables, photographs, graphs. (T29, R6, R7, SS)

176-T. Helical Steel Springs. *Metal Progress,* v. 68, Aug. 15, 1955, p. 76-81.

Deals with extension and compression springs, both cold and hot wound. Proper selection of spring steel wire and the principle considerations of design. Diagrams, graphs, tables. (T7, ST)

177-T. Metallurgy in Nuclear Energy. D. W. Lillie. *Metal Progress,* v. 68, Sept. 1955, p. 82-84.

Elucidation of uranium metallurgy leads the list of spectacular metallurgical achievements in the nuclear energy field, others have to do with zirconium, beryllium, graphite and other fuel materials, and the problems arising from radiation damage. (T25, U, Zn, Be)

178-T. Properties and Characteristics of a Quenched and Tempered Steel for Pressure Vessels. W. D'Orville Doty. *Welding Journal,* v. 34, Sept. 1955, p. 425S-441S.

Notch toughness, metallurgical, welding, and gas cutting characteristics, and tensile and fatigue properties tested. Tables, graphs, micrographs, diagrams. 9 ref. (T26, ST)

179-T. Design of Welded Pressure Vessels Using Quenched and Tempered Steel. L. P. Zick. *Welding Journal,* v. 34, Sept. 1955, p. 442S-448S.

Covers allowable working stresses, design of appurtenances, welding affects on design, and use of material. Diagrams, tables, photographs. 11 ref. (T26, K general, ST)

180-T. Suitability of Quenched and Tempered Steels for Pressure Vessel Construction. Leon C. Bibber. *Welding Journal,* v. 34, Sept. 1955, p. 449S-464S.

Required ductility, elastic ratios, relationship between ductility and toughness and necessity for stress relieving. Results of destructive tests of eight full-scale pressure vessels. Diagrams, tables, photographs, graphs. 8 ref. (T26, ST)

181-T. (German.) **Nonferrous Metals in Electrical Engineering. II. Economic Survey Development in Open-Air Lines.** A. Schwarz. *Metall,* v. 9, nos. 17-18, Sept. 1955, p. 753-757.

Problems of utilization of different metals as open-air conductors, and protection of line and masts by coatings. Tables, graphs, diagrams, photograph. 24 ref. (T1, Al, Cu, Pb)

182-T. (Pamphlet.) **Aluminium in Ships' Structures. A Review of Current Practice.** L. M. C. Robinson. 31 p. 1954. Aluminium Development Association, 33 Grosvenor St., London.

Concerned with materials, their joining and construction. (T22, Al)

V

Materials

General Coverage of Specific Materials

245-V. Aluminum 2011. Free-Cutting Wrought Aluminum Alloy. *Alloy Digest,* no. Al-32, Oct. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, corrosion resistance, specification equivalents, general characteristics, forms available and applications. Tables. (Al)

246-V. Aluminum 5083. Non-Heat-Treatable Wrought Aluminum Alloy. *Alloy Digest,* no. Al-33, Oct. 1955.

Composition, physical constants, properties, workability, weldability, brazing, corrosion resistance, specification equivalents, general characteristics, forms available and applications. Tables. (Al)

247-V. Meehanite—GE. Medium Strength, Close Grain Iron. *Alloy Digest,* no. CI-12, Oct. 1955.

Composition, physical constants, properties, heat treatment, machinability, castability, general characteristics, forms available, applications. Tables. (CI)

248-V. Lumen Alloy 11-C. Aluminum Bronze. *Alloy Digest,* no. Cu-32, Oct. 1955.

Composition, physical constants, properties, heat treatment, machinability, castability, workability, weldability, corrosion resistance, specification equivalents, general characteristic, forms available, applications. Tables. (Cu)

249-V. Nitralloy 135. Nitriding Steel. *Alloy Digest,* no. SA-34, Oct. 1955.

Composition, physical constants, properties, machinability, heat treatment, workability, weldability, corrosion resistance, general characteristics, forms available, applications. Tables. (AY)

250-V. Enduro AA-FM. Free-Cutting Stainless Steel-Type 430F. *Alloy Digest,* no. SS-35, Oct. 1955.

Composition, physical constants, properties, heat treatment, workability, machinability, weldability, corrosion resistance, scale removal, specification equivalents, general characteristics, forms available, applications. Tables. (SS)

251-V. Republic RS-140X. Titanium Alloy. *Alloy Digest,* no. Ti-7, Oct. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability, general characteristics, forms available, applications. Tables. (Ti)

252-V. Graph-Tung. Graphitic Tool & Die Steel. *Alloy Digest,* no. TS-39, Oct. 1955.

Composition, properties, heat treatment, machinability, workability, general characteristics, forms available, applications. Tables. (TS)

253-V. Materials Handbook. IV. Properties of Titanium. Harry Majors, Jr., R. T. Webster, R. H. Wallace and G. E. Wendell. *California Research and Development Company, (U. S. Atomic Energy Commission),* CRD-A19-27, Apr. 1953, 60 p.

Summarizes current knowledge of properties, creep and rupture, fatigue, fabrication characteristics. Tables, graphs. (Ti)

254-V. Materials Handbook. VII. Properties of Tantalum. H. Majors, Jr., R. H. Wallace, R. T. Webster and G. E. Wendell. *California Research and Development Company, (U. S. Atomic Energy Commission),* CRD-A19-27, Apr. 1953, 25 p.

Summarizes current knowledge of properties, casting and welding behavior. Tables. 10 ref. (Ta)

255-V. Modern Stainless Steels. *Edgar Allen News,* v. 34, Sept. 1955, p. 201-202.

Polishing, soldering and brazing considered. Photographs. (To be continued.) (L10, K7, K8, SS)

256-V. Lead and Its Alloys. Kempton H. Roll. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 2, p. 1986-1989.

Research progress, corrosion characteristics, engineering advances. Graph. 43 ref. (Pb)

257-V. Iron and Mild Steels, Including Low Alloy Steels. Homer L. Shaw. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 2, p. 1982-1985.

Summarizes information published on iron, mild steels and low-alloys steels in 1954. Photograph. 52 ref. (Fe, ST, AY)

258-V. Nickel, Including High-Nickel Alloys. H. O. Teeple. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 2, p. 1990-2006.

Considers alloys containing about 40% or more of nickel or substantial quantities of cobalt, emphasizing the developments in supply sources of nickel and cobalt, new alloys or improvements in present ones, fabrication, applications. Photograph. 266 ref. (Ni, Co)

259-V. Stainless Steels. Including Other Ferrous Alloys. Walter A. Luce. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 2, p. 2023-2035.

Discussion of corrosion, mechanical properties and structure, high-temperature alloys, welding, miscellaneous iron-base alloys. Photographs. 198 ref. (SS, AY)

260-V. Titanium. Howard B. Bomberger. *Industrial and Engineering Chemistry,* v. 47, Sept. 1955, pt. 2, p. 2041-2043.

Most is being used in aircraft

frames and engines. Review covers processing and corrosion properties. Photograph. 38 ref. (T24, Ti)

261-V. Low Nickel Type 329 Offers Good Corrosion Resistance. R. A. Lula, W. G. Renshaw and J. B. Hill. *Iron Age*, v. 176, Sept. 8, 1955, p. 74-76.

Structure and properties as compared with other types. Hardening tendency, weld embrittlement, annealing properties. Micrographs, graphs, photograph, tables. (SS)

262-V. Survey of Corrosion-Resistant Metals and Alloys. G. A. Dummett. Paper from "Catalysts, Special Compounds and Chemical-Resistant Materials". Chemical and Chemical Engineering Series. George Newnes Ltd., p. 122-152.

Properties, fabrication, applications, selection criteria for use in chemical plants. Photographs, graph, tables. (SG-g)

263-V. (English.) **Aluminium-Copper-Cadmium Alloys.** E. A. G. Liddiard and H. K. Hardy. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 329-338.

Development of the alloys, variation in composition, melting, casting, working techniques, heat treatment, corrosion and stress-corrosion behavior, particular applications. Graphs, tables, photograph, micrographs, diagram. 9 ref. (Al, Cu, Cd)

264-V. (French.) **Heavy Alloys—Manufacturing Processes — Recent Improvements—Applications.** R. Bernard. *Metallurgia italiana*, v. 47, no. 7, July 1955, p. 309-314.

Reviews alloys of densities between that of lead and tungsten; applications of tungsten-nickel-copper and iron alloys. Tables, graphs, micrographs. 3 ref. (W, Ni, Cu, Fe)

265-V. (French.) **Super-Purity Aluminum: Its Development to the Stage of Practical Use.** Werner Syz. Paper from "Congres International de l'Aluminium". v. I. La Société d'Edition et de Documentation des Alliages Légers, p. 173-177; disc., p. 177-178.

Principle of refining aluminum by electrolysis with three superposed layers; development of electrolytic cell design; processing of the segregated crystals and their application to the aluminothermic welding of cables for electrical conductors and to the heating of risers in foundry molds; polishing, anodic oxidation coloring. Photographs, graphs. (Al)

266-V. (Polish.) **Cast Tin Bronzes.** Kazimierz Kurski. *Wiadomosci hutnicze*, v. 11, nos. 7-8, July-Aug. 1955, p. 214-220.

Chemical compositions, mechanical properties, corrosion resistance, microstructure, effect of heat treatment on machine, armature and bearing bronzes. Graphs, tables, micrographs. 6 ref. (Cu)

267-V. (Polish.) **Aluminum.** Kazimierz Doniec. *Wiadomosci hutnicze*, v. 11, nos. 7-8, July-Aug. 1955, p. 229-241.

World production before and after introduction of electrolysis; distribution of ores; production and electrolysis of pure aluminum oxide; uses of aluminum and aluminum alloys. Graphs, diagrams tables, map, photographs. 3 ref. (Al)

268-V. (Russian.) **Properties of 15Kh and 12KhN2A Steels With Boron Addition.** M. V. Pridantsev, G. L. Livshits and D. A. Kal'ner. *Stal'*, v. 15, no. 8, Aug. 1955, p. 734-739.

Addition of small amounts of boron considerably increased hardenability, toughness and plasticity, and made it possible to substitute them for structural steels with greater nickel contents. Chemical composition, resistance to wear and isothermal transformation of austenite, other properties. Graphs, tables. (AY)

269-V. High Nitrogen Austenitic Cr-Mn Steels. V. F. Zackay, J. F. Carlson and P. L. Jackson. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 5, 1955, 5 p.

Development of iron-base austenitic alloys, prepared by a pressure-melting and casting technique, capable of service between 1200 and 1400° F. Tables, graphs. 9 ref. (AY)

270-V. Properties of Vanadium Consolidated by Extrusion. C. E. Lacy and C. J. Beck. *American Society for Metals, Transactions*, v. 48, *Preprint No.* 37, 1955, 17 p.

Ductile vanadium, produced by the bomb reduction of V_2O_5 with calcium, was simultaneously consolidated and reduced to shape by hot extrusion. Chemical analyses, mechanical properties, recrystallization, behavior, metallographic structure and cold fabrication behavior were used to evaluate the extruded products. Photographs, graph, micrographs, tables. 8 ref. (F24, V)

271-V. Special Alloys. XII. *Copper & Brass Bulletin*, 1955, no. 174, Sept., p. 8-9.

Composition and properties of cupro-nickel, beryllium-copper, cadmium-bronze and tellurium-nickel-copper. Table, photographs. (Cu)

272-V. Zirconium: New Metal for Industry? Annesta R. Gardner. *Dun's Review and Modern Industry*, v. 66, Oct. 1955, p. 42-44, 52.

Qualities which make it a promising material and limitations to overcome. Photographs. (Zr)

273-V. Less Common Metals. E. M. Sherwood. *Industrial and Engineering Chemistry*, v. 47, Sept. 1955, pt. 2, p. 2044-2050, 2054-2064.

STATEMENT OF THE OWNERSHIP, MANAGEMENT AND CIRCULATION, REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933 AND JULY 2, 1946 (39 U. S. C. 233) OF METALS REVIEW

PUBLISHED MONTHLY AT CLEVELAND, OHIO

FOR OCTOBER 1, 1955

1.—The names and addresses of the publisher, editor, associate editor, and business manager are: Publisher, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio; Editor, M. R. Hyslop, 7301 Euclid Ave., Cleveland; Associate Editor, Betty A. Bryan, 7301 Euclid Ave., Cleveland; Business Manager, W. H. Eisenman, 7301 Euclid Ave., Cleveland.

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Marjorie R. Hyslop, Editor

Sworn to and subscribed before me this 1st day of October, 1955. (Seal) Ray T. Bayless, Notary Public. (My commission expires May 19, 1957.)

Zirconium, hafnium, molybdenum, tantalum, columbium and rhenium. Photographs, diagram, tables. 86 ref. (Zr, Hf, Mo, Ta, Cb, Re)

274-V. The Alloys of Uranium. H. A. Saller and F. A. Rough. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/558, June 1955, 29 p.

Review of alloying principles, phase diagrams and mechanical and physical properties. Tables, graphs. 22 ref. (U)

275-V. The Metallurgy of Thorium and Its Alloys. O. N. Carlson, P. Chiotti, G. Murphy, D. Peterson, B. A. Rogers, J. F. Smith, M. Smutz, M. Voss and H. A. Wilhelm. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/556, July 1955, 89 p.

Even though pure metal has poor properties for structural materials, additions of it to other metals are being studied extensively. Graphs, tables, micrographs. 146 ref. (Th)

276-V. Physical Metallurgy of Uranium. Frank G. Foote. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/555, July 1955, 84 p.

Physical and thermal properties, plastic deformation, preferred orientation, recrystallization and grain growth, thermal expansion and cycling, irradiation, mechanical properties, aqueous corrosion, phase diagrams and transformation kinetics in alloys. Graphs, photographs, micrographs, diagrams. 17 ref. (U)

277-V. Preparation of Nuclear Poison and Control Alloys. Stainless Steel Base Boron Alloys. A. P. Beard, C. J. Beck, J. W. Harrison and W. B. Clark. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission),* KAPL-1371, June 1955, 31 p.

Preparation, properties and microstructure of stainless steel containing up to 3.2% boron. Table, photograph, graphs, micrographs. 10 ref. (SS, B)

278-V. Nodular or Ductile Iron. John L. Everhart. *Materials & Methods,* v. 42, Oct. 1955, p. 119-134.

Mechanical and physical properties, heat treatment and applications of commercial grades. Photographs, tables, diagram, graphs. (CI)

279-V. Zirconium—Fabrication Techniques and Alloy Development. C. E. Lacy and J. H. Keeler. *Mechanical Engineering,* v. 77, Oct. 1955, p. 875-878.

Neutron-absorption characteristics, mechanical properties, corrosion resistance. Tables, photographs, graphs. (Zr)

280-V. The Selection of Gray Cast Iron. *Metal Progress,* v. 68, Aug. 15, 1955, p. 21-36.

Physical and metallurgical properties of the least expensive of cast metals. Tables, graphs, diagrams, micrographs, photographs. (CI)

281-V. The Selection of Aluminum Alloy Castings. *Metal Progress,* v. 68, Aug. 15, 1955, p. 50-63.

A guide to selection of casting method and alloy for parts; design data and process limitations; typical variations in mechanical properties. Graphs, diagrams, tables. (Al)

282-V. Copper and Its Alloys. John R. Freeman, Jr. *Metal Progress,* v. 68, Sept. 1955, p. 85-87.

Trends and recent developments. Copper has met the challenge of substitute materials by modernizing its equipment and introducing fundamental research into an old industry. Photograph. (Cu)

283-V. Carbon and Alloy Steels. Max W. Lightner. *Metal Progress,* v. 68, Sept. 1955, p. 93-97.

Advances experienced in carbon and alloy steel production in the past 25 years have been characterized by tailoring the steel shape, surface, analysis and metallurgical characteristics to suit the intended fabrication and application. Photographs. (ST)

284-V. Stainless and Heat Resistant Alloys. V. N. Krivobok and E. N. Skinner. *Metal Progress,* v. 68, Sept. 1955, p. 118-122.

Composition and properties of chromium-nickel steels and cobalt and nickel alloys. (SS, SG-g, h)

285-V. Super-Refractory Materials. Roger A. Long. *Metal Progress,* v. 68, Sept. 1955, p. 123 + 7 pages.

Composition and properties. Most promising are the TiC plus metal binder (or vice versa), representing the cermets; MoSi, representing the intermetallics; and molybdenum, representing the refractory elements. Photographs, table. (SG-h)

286-V Light Metals and Alloys. N. E. Promisel. *Metal Progress,* v. 68, Sept. 1955, p. 144-148.

Trends in improvement in properties, applications, future trends. Tables, graphs. (Al, Mg, Ti)

287-V. (Dutch.) Certain Metallurgical Properties of Cast Alloys. E. M. H. Lips. *Bedrijf en Techniek,* v. 10, no. 235, Aug. 27, 1955, p. 422-423, 435; disc., p. 435.

Cutting, milling, forging, extrusion, welding and soldering methods which may be used in working aluminum cast alloys. Tables, diagrams. (Al)

288-V. (Book.) International Aluminum Congress. v. I-II. 358 and 333 p. 1954. La Société d'Edition et de Documentation des Alliages Légers, 77 Blvd. Malesherbes, Paris-8e, France.

French and English reports on aluminum chemistry and physiochemistry, production, analytical processes, alloys, anodic oxidation and corrosion, transformation techniques, fields of application. Papers individually abstracted. (Al)

EMPLOYMENT SERVICE BUREAU

The Employment Service Bureau is operated as a service to members of the American Society for Metals and no charge is made for advertising insertions. The "Positions Wanted" column, however, is restricted to members in good standing of the A.S.M. Ads are limited to 50 words and only one insertion of any one ad. Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, O., unless otherwise stated.

POSITIONS OPEN

Midwest

METALLURGICAL ENGINEER: Graduate, some experience helpful but not essential. Exceptional opportunity in diversified work with medium-size manufacturer of power and process equipment. Western Pennsylvania. Box 11-5.

ENGINEERS: High-caliber men with degrees in mechanical, industrial, management, metallurgical or civil engineering and physics, at salaries ranging from $4345 to $8990, to perform vital work in connection with the design and development of ordnance materiel. Write to: R. F. Donohue, Civilian Personnel Office, Watervliet Arsenal, Watervliet, N. Y.

METALLURGIST: Steel fabricating plant in Indianapolis has opening for metallurgical engineering graduate with ferrous experience and training for work in material and product control laboratory. Permanent position with good opportunity for qualified person who has initiative and can accept responsibility. In reply, give details as to age, marital status, education, experience and approximate salary expected. Box 11-10.

METALLURGICAL GRADUATES: Openings in mill production metallurgical group and laboratory in mill producing high speed steels, toolsteels, stainless, high-temperature alloys and many specialty steels. Will consider both experienced men and recent graduates interested in these fields. Reply giving details of education, experience, age, references, etc. to: Personnel Dept., Universal-Cyclops Steel Corp., Bridgeville, Pa.

METALLURGIST: Mature experienced metallurgical graduate with plant or laboratory background. Position involves metallurgical quality control, plant trouble shooting and challenging production problems, with opportunity to grow with an expanding organization. Knowledge of both ferrous and nonferrous metallurgy desirable. Modern plant located in metropolitan area. State education, experience and salary expected. Box 11-20.

ELECTROCHEMIST: Mature experienced graduate, preferably a person with some metallurgical background, to work on production plating problems of unusual and challenging nature. Position involves laboratory work, plant liaison and process improvement in electrodeposition of chromium, nickel, silver and lead alloys. Modern plant in metropolitan area. State education, experience and salary expected. Box 11-25.

MECHANICAL METALLURGIST: Opening for young mechanical metallurgist with one to two years experience, to work on interesting research and development programs. This is a permanent position with an organization offering excellent opportunities for personal and professional growth. Liberal benefits, including generous tuition refunds for graduate study. Send resume to: T. E. DePinto, Armour Research Foundation of Illinois Institute of Technology, 10 West 35 St., Chicago 16, Ill.

TECHNICAL DIRECTOR: Medium-size electric steel foundry offers excellent opportunity for technically experienced steel foundryman to assume charge of established technical division responsible for metallurgy, inspection, pattern rigging and product development. Please include age, education and resume of experience with reply. Box 11-30.

CHIEF INSPECTOR: Medium-size electric steel foundry needs chief inspector to take full charge of inspection department. Must have knowledge of casting inspection procedures and be able to contact customers. Engineering background desirable. Box 11-35.

SALES ENGINEER: Long-established, progressive steel foundry expanding production facilities needs sales engineers working out of Chicago and Detroit. Age 30 to 40, industrial sales experience (not necessarily in foundry), college degree in engineering or equivalent in experience. Send complete resume, salary information and recent photograph if available. Box 11-40.

GRADUATE METALLURGISTS: With one or more years appropriate industrial experience will find the diversified, non-routine applied research program at Battelle very attractive. Activities cover all phases of ferrous and nonferrous metallurgy. Starting salaries and promotion in keeping with individual accomplishments. Applications handled promptly and confidentially. Please write today to: The Personnel Manager, Battelle Memorial Institute, 505 King Ave., Columbus 1, Ohio.

METALLURGICAL ENGINEER: Excellent opportunity in research department of major automotive manufacturer. Require three to five years experience in heat treatment of steel and at least a B.S. degree in metallurgy. Box 11-45.

TITANIUM METALLURGIST: Either experienced man or one interested in entering this field covering titanium production in mill converting to bars, forgings, sheet, strip and wire. Work will include both the technical and production aspects of material. Send information on education, experience, age, references, etc. Box 11-50.

SALES ENGINEER: For large furnaces, Cleveland, Pittsburgh and Buffalo area. Well-established furnace company desires experienced man for sales of field erected type electric and fuel fired heat treating furnaces and atmosphere equipment to metalworking plants and mills. Must be capable of selling at management level. Salary, expenses and bonus. Send resume including age, experience and income record. Our men know of this ad. Box 11-55.

PROPOSAL DRAFTSMAN: Capable of original designs for large mechanized heat treating furnace applications. Salary open depending on experience. Send resume. Our men know of this ad. Box 11-60.

RESEARCH and DEVELOPMENT ENGINEERS: With degree in metallurgy, mechanical engineers, plus minimum of five years experience developing manufacturing processes and estimating tooling, material and manpower for one or more of the following types of operations: Foundry, forging, machining or extrusion of steel and/or titanium parts. Must be "self-starter" with ability to iniate projects from sales orders. $7500 to $9000 depending on background. INDUSTRIAL ENGINEERING SUPERVISOR: With degree and at least five years of work standards and methods experience in sizeable metals fabricating field. Knowledge of plant layout methods helpful. $7200. FOUNDRY PRODUCTION SUPERVISOR: With degree and ten years all-around foundry experience, with fairly large portion of such experience in high-temperature alloy field. Will direct all foundry operations through general foremen and foremen. $8000 to $9000. EXTRUSION PROCESS ENGI-

NEER: Recent graduate with about a year of forging background or steel extrusion operations. Will train to follow through on extrusion processes, estimate tooling, material and manpower. $6200. Write for more details to : J. E. Frost, Wage and Salary Administrator, Metals Processing Div., Curtiss-Wright Corp., 162 Grider St., Buffalo 15, N. Y.

East

METALLURGIST: Needed as process metallurgist in brass mill manufacturing beryllium-copper, phorphor-bronze and nickel-silver in the form of strip, wire and rod. Reply fully in writing giving age, experience and salary desired to: Personnel Dept., The Riverside Metal Co. Div., H. K. Porter Co., Inc., Riverside, N. J.

POSITIONS WANTED

ASSISTANT CHIEF METALLURGIST: B.S. degree, age 40, married. Fifteen years diversified experience in gear metallurgy, covering machining, furnace atmospheres, heat treat equipment, field failures and development work. Capable of setting up and operating gear heat treat. Desires position as chief metallurgist, staff advisor or sales engineer. Prefers Detroit area. Box 11-65.

TUBING ENGINEER: Degree, 21 years experience in tube (Bundyweld and electricweld) forming, brazing, welding, sinking, drawing and terne-coating. Experience includes writing of material specifications, control of materials, checking and improving processes, developing new processes and trouble shooting production problems. Desires production supervisory position at high level. Available immediately. Box 11-70.

SALES or REPRESENTATIVE: Eastern sales or engineering representative. Over 20 years experience in developing sales and contacting the larger companies. Desires accounts or projects for handling and development. Can obtain real cooperation and produce results. Box 11-75.

MECHANICAL ENGINEER - SALES: European degree, 16 years diversified experience here and abroad in steel, light metal and welded products. Desires position as sales engineer or field representative for manufacturer of industrial equipment or products. Will consider work here or abroad. Naturalized U.S. citizen, two foreign languages, best references. Box 11-80.

DEVELOPMENT ENGINEER: Graduate metallurgical engineer registered in Ohio. Ten years experience in the design, fabrication and testing of high-temperature and corrosion resistant process equipment. Experienced and interested in the development of furnace brazed equipment for atomic power and gas turbine applications. Age 32, married, veteran. Box 11-85.

SALES REPRESENTATIVE: B.S. in industrial engineering, age 30, married, two children, veteran. Two and one-half years in building materials sales, two years industrial engineering in ferrous foundry, principally centrifugal process, two years ferrous, open die forging sales. Presently employed but would consider change. Present location eastern seaboard but will relocate for advancement. Box 11-90.

METALLURGICAL ENGINEER: B.S., M.S. degree credits. Six years diversified experience. Strong vacuum melting, powder metallurgy, wire drawing, metal cladding and annealing atmospheres experience. Some metal laboratory work. Moderate white metal smelting and refining experience. Desires position with opportunity for advancement. Box 11-95.

METALLURGIST: Ph.D. degree, age 28. Five years diversified experience in physical metallurgy research including titanium alloy development program. Also part-time teaching experience. Desires responsible position in progressive organization doing basic and/or applied research. Not averse to some administrative duties. Location immaterial. Box 11-100.

LECTURER in METALLURGY: At British college of technology, requires temporary position, approximately six months, to gain experience in American industry. Age 33, 12 years diversified experience in ferrous and particularly nonferrous production metallurgy, failure investigation and inert-gas welding research. Two years teaching experience. Box 11-105.

METALLURGICAL ENGINEER: M. Met. E. expected in January. Age 24, married. Two and one-half years experience in light metal alloy development and physical metallurgy re-

search. Desires responsible position, preferably in research and development. Will consider any location in East or Midwest, preferably near an institution for continuing education. Available in February. Box 11-110.

METALLURGIST: B.S. in chemical engineering, age 38, married. Family. Five years experience in metallurgical laboratory dealing with gas analysis, writing of technical reports on field failures and machine shop problems. 5 yr. experience in heat treat supervision, gear problems, material specifications, die quenching. Prefers Midwest. Box 11-115.

AIRCRAFT METALLURGIST: B. S. chemistry and metallurgy in 1943, veteran, age 37. Desires position of responsibility in any phase of plant operations utilizing a fundamental knowledge of materials and processes and broad experience in related metallurgical problems. Minimum salary $8000. Opportunities for advancement must be reasonable if qualified. Box 11-120.

METALLURGIST: Five years supervisory experience in bismuth and silver production. silver and gold refining, electrical precipitation units. Desires challenging position in processing or fabrication of metals, allowing travel. Western U.S. or Mexico preferred. Speaks Spanish and French. Family, two children, B.A. and B.S. in met. eng. Box 11-125.

PATENT ATTORNEY: Age 25, married, draft exempt. B.S. in metallurgical engineering, minor in chemistry. Three years engineering experience in heat treating, electroplating and anodizing. At present in third year evening law school. Prefers Chicago area. Box 11-130.

METALLURGICAL ENGINEER: M.S. degree, age 26, married. Five years diversified experience, including grey iron foundry, vacuum melting, extrusion, nuclear reactor fuel fabrication, chemical plant operation. Last three years as production supervisor. Desires responsible position in production supervision. Location immaterial, including foreign. Minimum salary $10,000. Box 11-135.

METALLURGICAL ENGINEER. M.S. degree, married. Fifteen years supervisory experience in metallurgical development programs, including metal fabrication, vacuum melting, powder metallurgy and ceramics. Experienced in atomic energy field and with materials for reactor fuel elements. Desires responsible and challenging supervisory position. Q cleared. Box 11-140.

METALLURGICAL - CORROSION ENGINEER: B.S. degree, age 26, married, veteran. Three years experience in metallurgy, corrosion and welding in major oil refinery. Desires responsible position in South, Southwest or West. Box 11-145.

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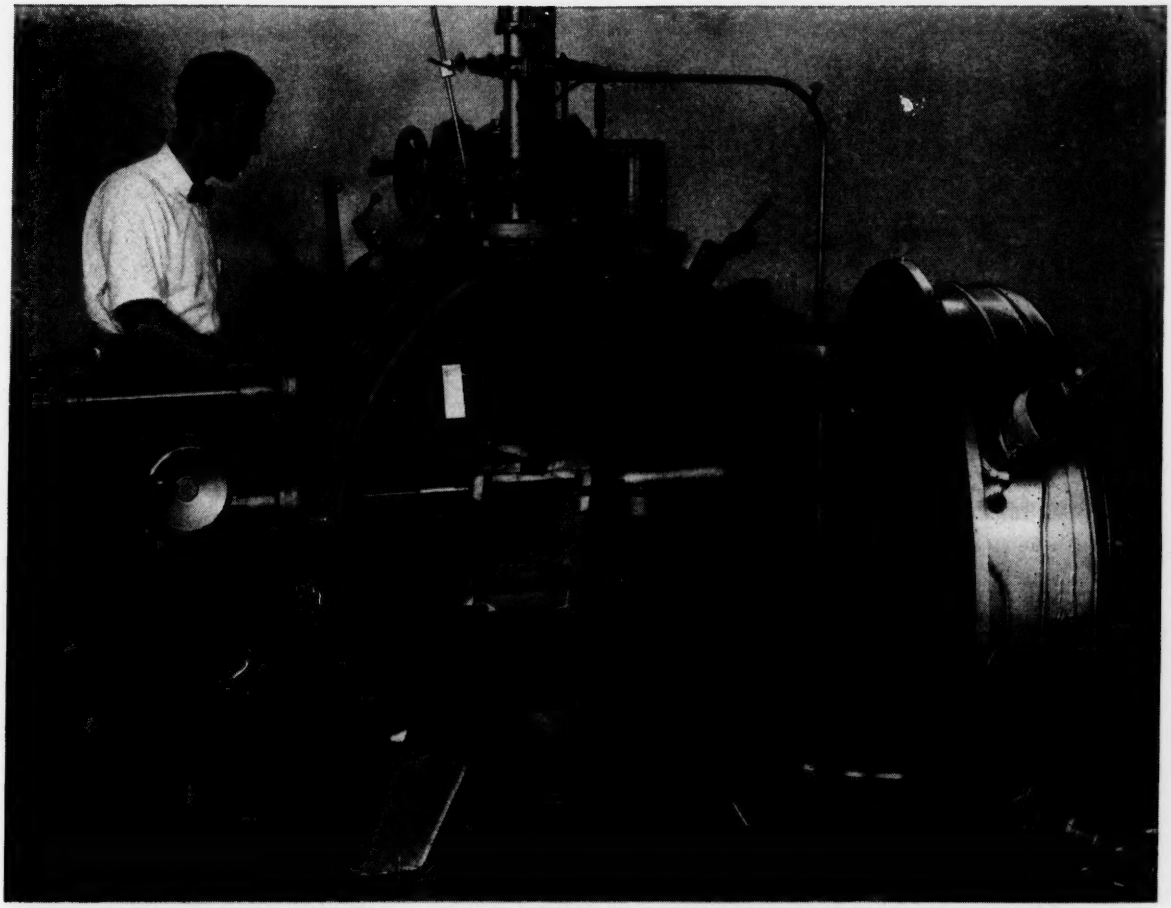

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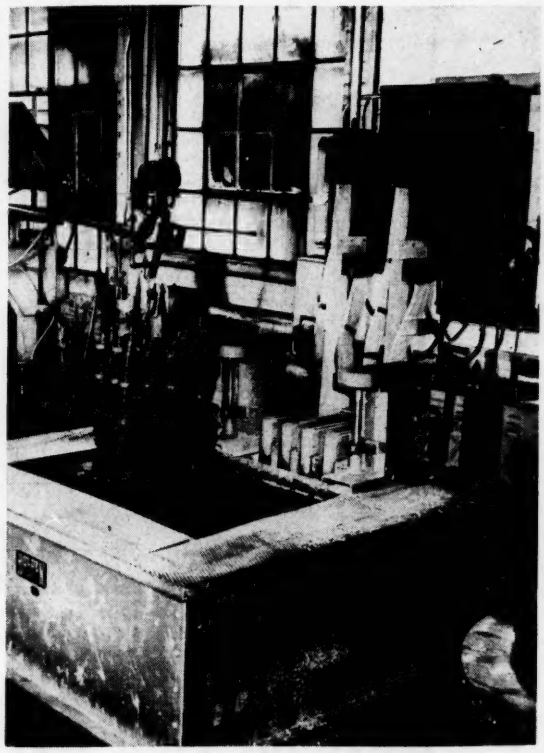

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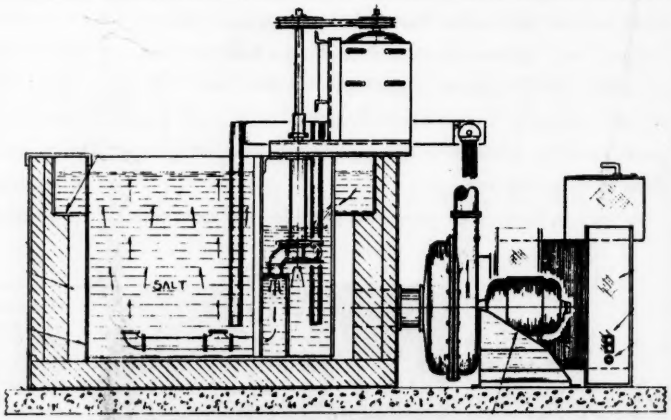

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